VI

COMPARATIVE ANALYSES AND FINDINGS

In this chapter we summarize the conclusions reached from the tracer study and the air quality modeling simulations. As previously discussed, the tracer study provided data that would allow for a qualitative comparison of the onshore impacts (dispersion only) between the proposed and existing shipping lanes. In addition to the analysis of the tracer study data, modeling simulations were conducted to numerically compare the onshore impacts from each of the proposed control strategies – relocation of the shipping lane and voluntary speed reduction. As per the TWG, the modeling simulations did not consider photochemistry, due to the non-availability of a complete emissions inventory for the SCOS episodes and time considerations. We also include a brief summary of the findings and our recommendations to U.S. EPA to consider in their deliberations on a suitable control strategy to provide the emission reductions needed from marine vessels in the 1994 Ozone SIP. Our conclusions and findings are limited to an analysis of the impacts on the SCAQMD. As discussed previously, the TWG agreed to limit the analysis to the SCAQMD with the understanding that U.S. EPA may need to take into consideration the impacts on upwind and downwind regions when determining the most appropriate operational control for marine vessels.

A. TRACER STUDY ANALYSIS

The tracer study provided data on the trajectory and dispersion of ship emissions released from ships traversing the existing shipping lane and the proposed relocated shipping lane. The data collected allows for comparison between the differences in dispersion for the morning and afternoon periods on 3 days – August 23, 1997, September 4, 1997 and October 4, 1997. By looking at the dispersion characteristics qualitative information can be gleaned regarding the potential for onshore air quality impacts due to NO_x emissions from ships traveling in the shipping lanes along the coast. Greater dispersion implies the emissions are dispersed over a larger area or volume, resulting in lower concentrations of the pollutant available to participate in the photochemical reactions that form ozone and particulate matter. If dispersion is greater when ships are traveling along a particular shipping lane, presumably the emissions from those ships would have less potential impact on air quality than ships traveling along a lane that demonstrates less dispersion.

To assess the dispersion of emissions from the existing and proposed shipping lanes, the average normalized station peaks of the tracer measurements were determined and the ratios of impacts were calculated. These ratios, which were first presented in Table

IV-13 are shown again in Table VI-1 below. Ratios less than 1.0 imply greater dispersion from the proposed lane and those greater than 1.0 imply less dispersion from the proposed lane. Ratios near 1.0 imply similar dispersion for the two lanes.

Table VI-1
Ratios* of Proposed Shipping Lane Impact to Current Shipping Lane Impact in the South Coast AQMD

	Ratio for Morning Release	Ratio for Afternoon Release
August 23, 1997	0	1.79
September 4, 1997	0.40	0.21
October 4, 1997	N/A	0.99

* *The ratio of average normalized station peak concentrations for the proposed lane to that from the current lane, from Table IV-12*

The data do not demonstrate a consistent pattern. While the ratios for the morning releases demonstrate greater dispersion from the proposed shipping lane on the tracer release days, the afternoon releases did not show any consistency. For the afternoon releases, there was less dispersion from the proposed lane on the August 23^{rd} release date, more on September 4^{th} and similar dispersion from the existing and proposed shipping lanes on the afternoon of October 4, 1997. These results suggest that meteorology influences the direction and the magnitude of dispersion from ship emissions. Wind circulation patterns in the area offshore of Southern California can be very complex. Day to day, as well as diurnal, differences in wind directions can be very great and in turn can impact transport and diffusion mechanisms in the region.

B. MODEL SIMULATIONS

Model simulations were developed for two episode periods, August 3-7, 1997 and September 3-5, 1997, using an Eulerian air quality modeling system. In each case, the emissions of NO_x from each of the five control strategies were simulated without photochemistry and the net onshore mass flux into the SCAQMD was calculated. To assess the relative impacts of shipping emissions from the shipping lane and speed scenarios representing each control strategy, comparisons of the mass flux among the control scenarios were made to assess the relative impacts of shipping emissions. The accumulated mass flux and its distribution along the shoreline provide an indicator of the impact of offshore emissions on onshore air quality – the lower the mass flux, the lower the potential influence on onshore air quality. When comparing control strategies, the emissions from the control strategy with the lowest mass flux into the SCAQMD would therefore have the least effect on onshore air quality.

The results from the simulations are presented in Table VI-2. The data from August 3^{rd} and September 3^{rd} are not included. As explained previously, data on these days may not be representative because they are start-up days for the modeling simulations and may be overly influenced by initial conditions.

Table VI-2
Daily Net Mass Flux (tons/day) into the South Coast Air Basin from Simulation Results for August 4-7 and September 4-5, 1997

Scenario	Aug. 4	Aug. 5	Aug. 6	Aug. 7	Sept. 4	Sept. 5
Current shipping lane	33.30	3.85	16.44	24.96	31.63	22.5
Speed control scenario #1	31.65	3.07	14.99	23.06	30.27	20.45
Speed control scenario #2	28.92	2.68	13.66	20.49	28.47	18.70
Speed control scenario #3	30.22	3.24	14.99	22.05	29.70	20.28
Proposed shipping lane	17.45	5.67	14.62	21.87	14.86	35.76

Some qualitative conclusions can be drawn from the simulation results. First, there is a mass flux benefit for all of the voluntary speed reduction alternatives for all the days simulated. While the magnitude varied from day to day, it correlates well with the expected emission reductions from each scenario. Scenario #2, which requires the most reduction in speed over a long distance and results in the greatest emission reductions in the SCAB inventory, demonstrated the largest reduction in the net mass flux for the three speed control scenarios. Similar to the results from the tracer study, the results from the model simulation of the proposed shipping lane did not reveal a consistent pattern. On two days, the largest benefit was seen from this control strategy, about a 50% reduction in flux, however, on both August 5th and September 5th, the mass flux was actually greater than that simulated for the base case. As discussed in Chapter V, it appears that the benefits from moving the shipping lane further offshore are highly dependent on the variable offshore wind flow patterns.

Obviously the days simulated represent a small subset of the total days in the SCAB. Therefore to put the modeling results in perspective, it would be useful to know how frequently the types of days simulated occur. To address this question, a meteorological classification analysis based on the meteorology and air quality from 1997 was conducted (see Appendix C). In this analysis, the 1997 days were sorted into frequency nodes, where a node represents a type of episode day. This analysis showed that the August and September episode days represent meteorological patterns that occur approximately 30% of the time and reflect 3 of the 6 types of days that have medium to high ozone potential in the SCAB. [5] Table VI-3 summarizes the results of the meteorological classification analysis.

[5] The weather patterns in 1997 reflected a reduced ozone potential indicative of the El Nino weather circulation that was building that summer.

Table VI-3
Frequency of Occurrence for the Types of Days Simulated
(from Appendix C)

Day Simulated	Episode Node (or Type of Day)	Frequency of Occurrence in 1997
August 4	9	7.1%
August 5	9	7.1%
August 6	9	7.1%
August 7	10	1.9%
September 4	10	1.9%
September 5	6	22.2%

As a potential further aid in interpreting the results of the modeling simulations, the modeling results for the days simulated (from Table VI-2) were combined with their frequency of occurrence to derive a weighted average reduction in net mass flux relative to the base case. Since there were multiple simulation days in nodes 9 and 10, the fluxes were first averaged for the days in those nodes before combining with the frequency of occurrence. The results of this analysis are presented in Table VI-4 below. As shown, the greatest benefit is demonstrated from the simulation of speed control scenario #2. In this scenario, the precautionary zone speed limit of 12 knots is extended to the overwater boundary of the SCAB and resulted in approximately a 16% decrease in flux onshore. Speed control scenarios #1 and #3 had comparable benefits at 8% and 10% reduction respectively, and the proposed relocated shipping lane had the least benefit.

Table VI-4
Average Weighted Percent Change in Net Mass Flux (tons/day) into the South Coast Air Basin from Simulation Results for August 4-7 and September 4-5, 1997

Scenario	Average Flux by Node (tons/day)			Weighted Average Flux* (tons/day)	Change in Weighted Flux from Base Case
	Node 9 *(Aug. 4, 5, 6)*	Node 10 *(Aug. 7, Sept. 4)*	Node 6 *(Sept. 5)*		
Current shipping lane	17.86	28.30	22.50	6.80	-
Speed control scenario #1	16.57	26.67	20.45	6.22	-8%
Speed control scenario #2	15.09	24.48	18.70	5.69	-16%
Speed control scenario #3	16.15	25.88	20.28	6.14	-10%
Proposed shipping lane	12.58	18.37	35.76	9.18	+35%

* Σ (node average) x (node frequency) for each of the nodes

Because of the limited number of days simulated, it is important to keep in mind the following caveats when interpreting the results in Table VI-4:

- A total of six days were simulated, representing meteorological patterns that occur approximately 30% of the time and reflect 3 of the 6 types of days that have medium to high ozone potential in the SCAB. However, the other three types of days with medium to high ozone potential were not captured.

- A single day (September 5) was used in the weighted average flux calculation for node 6, whereas there were multiple days available for the other two nodes. As shown in Table VI-2, fluxes for different days with the same node type can vary. It is not known how representative the September 5 flux is for an average node 6 day.
- The frequency distribution of meteorological patterns in 1997 is not necessarily representative of other years.

During the TWG discussions, questions were raised regarding how the results could be used to estimate the emission reductions with respect to the SIP. Consistent with current practices, the expected emission reductions that can be claimed for SIP credit are determined from the actual change in the emissions inventory (for South Coast Air Basin) – not a reduction based on photochemical model simulations. To approximate potential SIP credit for the different control strategies we calculated a control factor based on the emissions estimates for each control strategy as compared to the base case (i.e. a percent reduction or increase in emissions). This control factor was then applied to the forecasted inventory for marine vessels in 2010. Since the controls would only be applied during the cruising mode (not maneuvering or hotelling), the control factor was only applied to that portion of the inventory that represented ships in the cruise mode. Because we did not have an ungridded emissions estimate for the proposed shipping lane, the estimate for the proposed shipping lane is based on a control factor calculated from the gridded inventory. Three key assumptions with this approach are: 1) ship type and activity in 2010 is similar to the activity during the August 3-7, 1997 episode, 2) the ship activity during the August 3-7, 1997 episode is representative of a typical summer day, and 3) the gridded emissions for the proposed shipping lane provide a good approximation of the ungridded emissions inventory. As shown in Table VI-5, Speed control scenario #2 approaches the 1997 Ozone SIP (and 1994 Ozone SIP) M-13 target for the voluntary control strategies. In the 1997 SIP, the planned reductions for M-13 expected a 29% reduction in the cruising emissions from the ocean going fleet in the SCAB.

Table VI-5
1997 SIP Emission Reduction Estimates
Tons per Day NOx

Control Strategy	Expected Emission Reductions	Percent Change	Control Factor	1997 SIP Estimated Reductions (2010)*
Speed control scenario #1	-2.96	-10.5%	0.11	-2.9
Speed control scenario #2	-6.53	-28.5%	0.28	-7.3
Speed control scenario #3	-3.98	-18.8%	0.19	-4.9
Proposed shipping lane	+0.51	+2.2%	0.02	+.52

*To determine the estimated reductions, the control factor was applied to the 1997 SIP projected 2010 N0x emissions (26.2 T/D) for ocean-going vessels calling on the POLB and POLA while in the cruising mode. These emission reduction estimates already account for the precautionary speed zone reduction requirement that was instituted in 1994 since the forecasted inventory is based on a 1997 SCAB baseline inventory.

C. SUMMARY OF FINDINGS

Based on the results from the tracer analysis and the modeling simulations, it can be concluded that a voluntary speed reduction control strategy would likely result in consistent emission reduction benefits in the SCAB with the magnitude of the benefits dependent on the extent of the speed reductions and the time spent in the reduced speed mode. Control Scenario #2, which requires a speed limit of 12 knots between the ports and the SCAB overwater boundary, appears to provide the greatest benefit with respect to both NO_x emissions and the flux of NO_x emissions that reach onshore, demonstrating approximately a 28% reduction in the emission inventory and a 16% reduction in flux when compared to the base case. Although the control strategy to move the shipping lane further offshore does provide benefits on certain types of days, it does not appear to provide a consistent benefit and it is not possible to reach definitive conclusions about this strategy. Because the modeling simulations did not consider photochemistry, it is also not possible at this time to determine the comprehensive air quality impacts relative to ozone and particulate matter formation attributed to NOx emissions from marine vessels from the various alternatives. To understand the comprehensive air quality impacts, comprehensive photochemical and aerosol modeling should be conducted. For the next SCAQMD Air Quality Management Plan update photochemical and aerosol modeling will be performed and should provide additional information on the impacts of shipping emissions on ozone and fine particulate formation.

APPENDIX A

Scope of Analysis

Appendix A

SCOPE of ANALYSIS

Throughout the working group process, a number of issues were raised on which the TWG reached consensus that the issues were beyond the scope of the comparative analysis being conducted by the TWG. In this appendix, we provide a brief description of the main issues that were identified. The U.S. EPA intends to work with members of the TWG to evaluate any issues that may need to be addressed before making a decision on the most appropriate operational control strategy for marine vessels

Future Ship Speeds: The baseline emissions inventory is based on the estimated ship speeds for the current fleet of ships using the POLA and POLB. The TWG believed accurate data was not available to project the ship speeds that would occur in future years (i.e. 2010). Due to time constraints and lack of data, the comparative analysis is limited only to the current inventory; no projections were made for the future impact of any of the proposed control strategies. The future ship speeds and their impact on the emissions inventory and potential emission reductions from any control strategy may need to be considered when determining the most appropriate operation control for marine vessels.

Photochemical Modeling: Ship emissions can be involved in complex overwater chemical reactions which may impact the amount of NOx emissions that reach the shoreline. Because of time constraints and the unavailability of the complete modeling emissions inventory for SCOS97, the TWG agreed to use dispersion modeling to assess the on-shore impacts of the shipping emissions relative to the quantity of emissions that reach shore in the SCAB. Photochemical modeling will not be ignored however, as photochemical modeling will be conducted during the development of the next comprehensive plan update (AQMP update) for the SCAQMD, expected final in 2001. Photochemical modeling is needed for the attainment demonstration for the 1-hour federal ozone standard and will provide additional information about the impact of shipping emissions on ozone, PM_{10} and toxics. For the next AQMP update the preferred control strategy will be included in the modeling exercise to help quantify the benefits of the overall control strategy on peak ozone and population exposure. We do not believe this will result in a change in our conclusions regarding the dispersion impacts of shipping emissions; however, once the chemistry is included in the modeling simulations, we may find that there are significant PM_{10} benefits from reducing NOx emissions from ships offshore.

Impacts Beyond SCAB Boundaries: Both of the control strategies evaluated may have the potential to shift the impact of ship emissions to areas outside the SCAB. The TWG had numerous discussions on what areas may be impacted and whether such a shift in emissions would occur. However, the TWG agreed that determining impacts outside the SCAB was beyond the scope of the comparative analysis may need to be considered when determining the most appropriate operational control for marine vessels.

Economic, Logistic and Other Impacts of Potential Control Strategies: There were numerous discussions on the impacts of the proposed control strategies including impacts on the U.S. Navy's Sea Range off the southern California coast and the loss of time and income that may occur if ships take longer to approach the ports due to travelling along an alternative route or traveling at a reduced speed. These impacts were outside the scope of the TWG's comparative analysis; however, the TWG agreed this may need to be considered when proposing a control strategy for marine vessels.

Appendix B

Day Specific Ship Activity Information And Emissions

Summary of Activity and Emissions Data for the August 3-7, 1997 SCOS97 Episode

In table B-1 we provide a detailed summary of the ship activity and emissions data for the August 3-7, 1997 episode. This includes information on the ship type, date, time, and direction of arrival and departure in the South Coast waters and the parameters used to calculate the NOx emissions. Additional parameters provided by the Marine Exchange but not included in this Table are call signs, previous port, next port, speed, initial berth, type of cargo, gross tonnage, and net tons. The following abbreviations are used to identify the ship types: Bulk Carrier (BBU); Bulk/Container Carrier (BCB); General Cargo (GGC); Refrigerated Cargo (GRF); Passenger (MPR); Vehicle Carrier (MVE); Chemical Tanker (TCH); Tanker (TTA); Container Carrier (UCC); and RORO Container Carrier (URC). In Table B-2 information on U.S. Navy ships is provided. In addition, we have included information on other pollutant emission estimates for the ships included in the inventory for the August 3-7 1997 SCOS97 episode as well as the methodology followed to estimate the emission benefits of the precautionary speed zone.

Table B-1

Activity Data and NOx Marine Vessel Inventory for the August 3-7, 1997 Episode

													Cruise						
Ship Name	Vessel type	Engine Type	# Eng.	Cycle	Actual Avg./Corrected speed	Arrive Gate	Arrive Dir	Arrive Date, Time	Depart Gate	Dept. Dir	Depart Date, Time	Aug 3-7th only-Hrs at Port	Entry Cruise for 3,4,5,6,7 (Y/N)	Exit Cruise for 3,4,5,6,7 (Y/N)	Entry Cruise Dist. (nmiles)	Entry Cruise Time (hours)	Exit Cruise Dist. (nmiles)	Exit Cruise Time (hours)	Actual HP Llyods
BEL ACE	BBU	D	1	2	12.46	QUEEN	S	8/3/97 10:10	QUEEN	N	8/3/97 14:35	4.42	Y	Y	34	2.73	39	3.13	11100
FARENCO	BBU	D	1	2	13.79	QUEEN	N	8/3/97 16:45	ANGEL	N	8/23/97 10:25	103.23	Y	No	40	2.90	39	2.83	19429
FIVI	BBU	D	1	2	14.42	ANGEL	N	8/2/97 16:10	ANGEL	N	8/9/97 16:35	119.98	No	No	40	2.77	39	2.70	11600
MODI	BBU	D	1	2	13.35	QUEEN	N	8/4/97 1:00	QUEEN	S	8/4/97 12:30	11.50	Y	Y	40	3.00	38	2.85	13100
NOSHIRO MARU	BBU	D	1	2	12.46	ANGEL	N	7/31/97 17:15	ANGEL	N	8/6/97 17:50	89.83	No	Y	40	3.21	39	3.13	11070
OTRADA	BBU	D	1	2	15.75	ANGEL	N	7/31/97 4:10	ANGEL	S	8/3/97 14:15	14.25	No	Y	40	2.54	38	2.41	13320
PERICLES C.G.	BBU	D	1	2	13.80	QUEEN	N	8/1/97 22:20	QUEEN	S	8/3/97 19:35	19.58	No	Y	40	2.90	38	2.75	17400
SAGACIOUS NIKE	BBU	D	1	2	13.80	QUEEN	N	8/4/97 15:15	QUEEN	N	8/12/97 3:50	80.73	Y	No	40	2.90	39	2.83	9750
SINGAPORE ACE	BBU	D	1	2	11.93	QUEEN	N	8/6/97 1:35	QUEEN	N	8/22/97 5:10	46.40	Y	No	40	3.35	39	3.27	15800
PACPRINCE	BCB	D	1	2	13.04	QUEEN	N	8/5/97 9:00	QUEEN	S	8/6/97 6:35	21.58	Y	Y	40	3.07	38	2.91	9500
PACPRINCESS	BCB	D	1	2	13.62	QUEEN	S	8/6/97 13:40	QUEEN	N	8/8/97 15:15	34.32	Y	No	34	2.50	39	2.86	9500
STAR DROTTANGER	BCB	D	1	2	13.35	ANGEL	S	8/5/97 4:50	ANGEL	S	8/6/97 21:20	40.50	Y	Y	34	2.55	38	2.85	13100
KARINA BONITA	GGC	D	1	2	15.29	QUEEN	N	8/3/97 9:35	QUEEN	S	8/5/97 5:25	43.83	Y	Y	40	2.62	38	2.49	11200
STAR GRIP	GGC	D	1	2	14.79	ANGEL	N	8/3/97 15:25	ANGEL	S	8/3/97 23:40	8.25	Y	Y	40	2.70	38	2.57	10120
VAIMAMA	GGC	D	1	4	13.90	QUEEN	S	8/3/97 6:50	QUEEN	N	8/4/97 2:40	19.83	Y	Y	34	2.45	39	2.81	8090
CHIQUITA FRANCES	GRF	D	2	4	18.20	QUEEN	S	8/7/97 3:55	QUEEN	S	8/8/97 9:05	20.07	Y	No	34	1.87	38	2.09	16213
MAGIC	GRF	D	1	4	18.20	QUEEN	S	8/4/97 6:10	QUEEN	S	8/5/97 3:20	21.17	Y	Y	34	1.87	38	2.09	8937
TUNDRA KING	GRF	D	1	2	18.20	ANGEL	N	8/4/97 6:40	ANGEL	S	8/4/97 19:35	12.92	Y	Y	40	2.20	38	2.09	13250
HOLIDAY	MPR	D	1	2	11.70	ANGEL	S	8/4/97 6:15	ANGEL	S	8/4/97 18:15	12.00	Y	Y	34	2.91	38	3.25	31973
JUBILEE	MPR	D	1	2	12.73	ANGEL	S	8/3/97 7:05	ANGEL	S	8/3/97 17:20	10.25	Y	Y	34	2.67	38	2.99	31962
VIKING SERENADE	MPR	D	1	2	11.00	ANGEL	S	8/4/97 6:25	ANGEL	S	8/4/97 17:30	11.08	Y	Y	34	3.09	38	3.45	27000
AYA II	MVE	D	1	4	16.38	ANGEL	S	8/6/97 10:55	ANGEL	N	8/6/97 19:35	8.67	Y	Y	34	2.08	39	2.38	16880
BELLONA	MVE	D	1	2	16.38	QUEEN	N	8/4/97 8:40	QUEEN	N	8/5/97 4:25	19.75	Y	Y	40	2.44	39	2.38	11560
FRANCONIA	MVE	D	1	2	16.11	QUEEN	S	8/7/97 20:50	QUEEN	N	8/8/97 16:25	3.15	Y	No	34	2.11	39	2.42	12480
GREEN LAKE	MVE	D	1	2	16.61	QUEEN	N	8/6/97 23:15	QUEEN	N	8/7/97 18:50	19.58	Y	Y	40	2.41	39	2.35	13119
HUAL CARMENCITA	MVE	D	1	2	16.70	ANGEL	N	8/7/97 9:55	ANGEL	N	8/7/97 23:55	14.00	Y	Y	40	2.40	39	2.34	1300
OPAL RAY	MVE	D	1	2	16.47	ANGEL	N	8/3/97 20:50	ANGEL	N	8/8/97 15:30	99.15	Y	No	40	2.43	39	2.37	12400
STOLT TENACITY	TCH	D	1	2	15.13	QUEEN	W	8/5/97 19:30	QUEEN	S	8/9/97 5:30	52.48	Y	No	43.5	2.88	38	2.51	17400
BT NESTOR	TTA	D	1	2	14.69	QUEEN	S	8/2/97 10:25	QUEEN	S	8/4/97 3:35	27.58	No	Y	34	2.32	38	2.59	16799
SAMUEL GINN	TTA	D	1	2	13.08	QUEEN	W	8/6/97 23:20	QUEEN	N	8/8/97 2:15	24.65	Y	No	43.5	3.33	39	2.98	18900
ACAPULCO	UCC	D	1	2	20.02	ANGEL	S	8/6/97 5:30	ANGEL	N	8/7/97 19:25	37.92	Y	Y	34	1.70	39	1.95	30991
ALLIGATOR BRAVERY	UCC	D	1	2	21.48	ANGEL	N	8/5/97 18:15	ANGEL	N	8/7/97 14:00	43.75	Y	Y	40	1.86	39	1.82	46960
APL SINGAPORE	UCC	D	1	2	24.10	ANGEL	N	7/31/97 18:10	ANGEL	N	8/6/97 3:40	75.67	No	Y	40	1.66	39	1.62	66398
AXEL MAERSK	UCC	D	2	2	22.02	QUEEN	N	8/2/97 6:30	QUEEN	N	8/3/97 19:45	19.75	No	Y	40	1.82	39	1.77	45800
BRISBANE STAR	UCC	D	1	2	18.66	ANGEL	N	8/7/97 12:35	ANGEL	N	8/12/97 18:25	11.40	Y	No	40	2.14	39	2.09	29000
BROOKLYN BRIDGE	UCC	D	1	2	19.37	QUEEN	N	8/2/97 5:20	QUEEN	N	8/4/97 17:25	41.42	No	Y	40	2.07	39	2.01	37440
CALIFORNIA JUPITER	UCC	D	1	2	20.02	ANGEL	N	8/7/97 4:45	ANGEL	N	8/8/97 21:05	19.23	Y	No	40	2.00	39	1.95	29520
CALIFORNIA SATURN	UCC	D	1	2	20.02	ANGEL	S	8/7/97 13:50	ANGEL	N	8/8/97 18:50	10.15	Y	No	34	1.70	39	1.95	29610
CAPE CHARLES	UCC	D	1	2	20.02	ANGEL	S	8/1/97 14:00	ANGEL	N	8/3/97 3:10	3.17	No	Y	34	1.70	39	1.95	32800
CHASTINE MAERSK	UCC	D	1	2	16.84	QUEEN	S	8/5/97 21:05	QUEEN	S	8/8/97 3:30	50.90	Y	No	34	2.02	38	2.26	14248
CHETUMAL	UCC	D	1	2	21.39	ANGEL	N	8/5/97 6:15	ANGEL	S	8/6/97 19:30	37.25	Y	Y	40	1.87	38	1.78	38542
DIRECT EAGLE	UCC	D	2	4	17.09	ANGEL	N	8/6/97 7:05	ANGEL	S	8/8/97 6:55	40.90	Y	No	40	2.34	38	2.22	22799
DOLE ECUADOR	UCC	D	1	2	18.38	ANGEL	S	8/3/97 9:55	ANGEL	S	8/4/97 16:55	31.00	Y	Y	34	1.85	38	2.07	20650
EMPRESS DRAGON	UCC	D	1	2	21.21	QUEEN	N	8/3/97 16:30	QUEEN	N	8/5/97 17:15	48.75	Y	Y	40	1.89	39	1.84	42100
EVER GLOWING	UCC	D	1	2	18.88	ANGEL	N	8/7/97 17:20	ANGEL	S	8/8/97 18:35	6.65	Y	No	40	2.12	38	2.01	23180
EVER GRADE	UCC	D	1	2	18.66	ANGEL	N	8/2/97 7:35	ANGEL	N	8/4/97 5:05	29.08	No	Y	40	2.14	39	2.09	21600
EVER RACER	UCC	D	1	2	21.11	ANGEL	S	8/7/97 5:10	ANGEL	S	8/8/97 6:00	18.82	Y	No	34	1.61	38	1.80	42120
EVER UNION	UCC	D	1	2	20.42	ANGEL	N	8/2/97 15:10	ANGEL	N	8/4/97 20:30	44.50	No	Y	40	1.96	39	1.91	59510
GEORGE WASHINGTON BRIDGE	UCC	D	1	2	20.40	QUEEN	N	8/4/97 17:35	QUEEN	N	8/7/97 15:50	70.25	Y	Y	40	1.96	39	1.91	28645
HANJIN LONDON	UCC	D	1	2	23.66	QUEEN	N	8/7/97 22:35	QUEEN	N	8/10/97 14:50	1.40	Y	No	40	1.69	39	1.65	74494
HANJIN PARIS	UCC	D	1	2	21.97	QUEEN	N	8/1/97 3:25	QUEEN	N	8/3/97 13:55	13.92	No	Y	40	1.82	39	1.78	74494
HYUNDAI DYNASTY	UCC	D	1	2	19.57	QUEEN	N	8/5/97 2:20	QUEEN	N	8/6/97 23:45	45.42	Y	Y	40	2.04	39	1.99	32560
HYUNDAI FREEDOM	UCC	D	1	2	24.10	QUEEN	N	8/7/97 19:30	QUEEN	N	8/10/97 14:40	4.48	Y	No	40	1.66	39	1.62	74419
HYUNDAI INDEPENDENCE	UCC	D	1	2	23.46	QUEEN	N	7/31/97 15:20	QUEEN	N	8/3/97 15:20	15.33	No	Y	40	1.71	39	1.66	74520

Table B-1

Activity Data and NOx Marine Vessel Inventory for the August 3-7, 1997 Episode

													Cruise						
Ship Name	Vessel type	Engine Type	# Eng.	Cycle	Actual Avg./Corrected speed	Arrive Gate	Arrive Dir	Arrive Date, Time	Depart Gate	Dept. Dir	Depart Date, Time	Aug 3-7th only-Hrs at Port	Entry Cruise for 3,4,5,6,7 (Y/N)	Exit Cruise for 3,4,5,6,7 (Y/N)	Entry Cruise Dist. (nmiles)	Entry Cruise Time (hours)	Exit Cruise Dist. (nmiles)	Exit Cruise Time (hours)	Actual HP Llyods
LUTJENBURG	UCC	D	1	2	20.48	QUEEN	N	8/1/97 6:10	QUEEN	W	8/3/97 6:45	6.75	No	Y	40	1.95	43.5	2.12	36353
MAGLEBY MAERSK	UCC	D	1	2	23.73	QUEEN	S	8/6/97 21:00	QUEEN	N	8/7/97 19:35	22.58	Y	Y	34	1.43	39	1.64	57677
MARE CASPIUM	UCC	D	1	2	20.60	QUEEN	N	8/4/97 5:45	QUEEN	N	8/5/97 20:40	38.92	Y	Y	40	1.94	39	1.89	27500
MAREN MAERSK	UCC	D	1	2	23.40	QUEEN	N	8/4/97 2:10	QUEEN	S	8/4/97 16:35	14.42	Y	Y	40	1.71	38	1.62	57677
MELBOURNE STAR	UCC	D	1	2	16.38	ANGEL	S	7/31/97 18:45	ANGEL	S	8/4/97 18:55	42.92	No	Y	34	2.08	38	2.32	17100
MING PLENTY	UCC	D	1	2	19.10	ANGEL	N	8/4/97 13:30	ANGEL	N	8/7/97 7:10	65.67	Y	Y	40	2.09	39	2.04	23690
MOKIHANA	UCC	D	1	2	22.70	ANGEL	N	8/4/97 6:05	ANGEL	N	8/5/97 22:10	40.08	Y	Y	40	1.76	39	1.72	43200
N O L RUBY	UCC	D	1	2	21.48	ANGEL	N	8/2/97 20:40	ANGEL	N	8/4/97 18:00	42.00	No	Y	40	1.86	39	1.82	38070
N O L ZIRCON	UCC	D	1	2	21.48	ANGEL	N	7/31/97 18:10	ANGEL	N	8/6/97 3:40	75.67	No	Y	40	1.86	39	1.82	38070
NEPTUNE JADE	UCC	D	1	2	17.75	ANGEL	N	8/7/97 6:25	QUEEN	S	8/7/97 18:55	12.50	Y	Y	40	2.25	38	2.14	31479
NYK SEABREEZE	UCC	D	1	2	18.94	ANGEL	N	8/1/97 23:30	ANGEL	N	8/3/97 20:10	20.17	No	Y	40	2.11	39	2.06	40500
OOCL AMERICA	UCC	D	1	2	15.10	QUEEN	N	8/2/97 6:10	QUEEN	N	8/6/97 5:30	77.50	No	Y	40	2.65	39	2.58	66120
SEA-LAND CHARGER	UCC	D	1	2	21.84	QUEEN	N	8/1/97 6:30	QUEEN	N	8/4/97 2:25	26.42	No	Y	40	1.83	39	1.79	49589
SEA-LAND GUATEMALA	UCC	D	1	4	16.58	QUEEN	S	8/7/97 5:15	QUEEN	S	8/7/97 21:30	16.25	Y	Y	34	2.05	38	2.29	11968
SEA-LAND PATRIOT	UCC	D	1	2	17.10	QUEEN	N	8/4/97 18:20	QUEEN	N	8/7/97 5:15	58.92	Y	Y	40	2.34	39	2.28	30150
SOVCOMFLOT SENATOR	UCC	D	1	2	19.11	QUEEN	S	8/3/97 6:10	QUEEN	N	8/4/97 12:10	30.00	Y	Y	34	1.78	39	2.04	29470
VLADIVOSTOK SENATOR	UCC	D	1	2	22.75	QUEEN	N	8/5/97 6:05	QUEEN	S	8/6/97 16:50	34.75	Y	Y	40	1.76	38	1.67	29501
YURIY OSTROVSKIY	UCC	D	1	2	17.54	QUEEN	N	8/2/97 6:20	QUEEN	S	8/3/97 2:00	2.00	No	Y	40	2.28	38	2.17	9421
ZIM AMERICA	UCC	D	1	2	19.11	QUEEN	S	8/2/97 5:35	QUEEN	N	8/3/97 18:05	18.08	No	Y	34	1.78	39	2.04	29440
ZIM CANADA	UCC	D	1	2	17.32	QUEEN	N	8/7/97 16:15	QUEEN	S	8/8/97 17:15	7.73	Y	No	40	2.31	38	2.19	29440
CHEVRON COLORADO	TTA	GT	1		14.10	QUEEN	S	8/3/97 16:00	QUEEN	W	8/5/97 5:05	37.08	Y	Y	34	2.41	43.5	3.09	12500
CHEVRON OREGON	TTA	GT	1		12.91	QUEEN	S	8/6/97 17:20	QUEEN	W	8/6/97 19:00	1.67	Y	Y	34	2.63	43.5	3.37	12500
																Entry Cruise Time (hours)		Exit Cruise Time (hours)	RFC @ Full (80%) Power (gal/hr)
ARCO INDEPENDENCE	TTA	ST	2		13.09	QUEEN	W	8/6/97 23:30	QUEEN	W	8/8/97 21:45	24.48	Y	No	43.5	3.32	43.5	3.32	2093.4
ARCO PRUDHOE BAY	TTA	ST	2		15.90	QUEEN	W	7/28/97 13:10	QUEEN	S	8/4/97 20:35	44.58	No	Y	43.5	2.74	38	2.39	1238.6
ARCO SAG RIVER	TTA	ST	2		14.24	QUEEN	W	8/5/97 21:20	QUEEN	W	8/7/97 22:20	49.00	Y	No	43.5	3.05	43.5	3.05	1128.1
ARCO SPIRIT	TTA	ST	2		13.91	QUEEN	W	7/30/97 16:45	QUEEN	N	8/3/97 18:00	18.00	No	Y	43.5	3.13	39	2.80	2093.4
BLUE RIDGE	TTA	ST	2		13.80	ANGEL	S	8/5/97 13:45	ANGEL	S	8/13/97 2:50	58.23	Y	No	34	2.46	38	2.75	793.8
FREDERICKSBURG	TTA	ST	2		15.77	ANGEL	W	8/5/97 20:00	ANGEL	W	8/7/97 21:05	49.08	Y	Y	43.5	2.76	43.5	2.76	1238.6
MARINE CHEMIST	TTA	ST	2		15.87	ANGEL	W	8/7/97 1:30	ANGEL	S	8/8/97 18:20	22.48	Y	No	43.5	2.74	38	2.39	1017.6
EWA	UCC	ST	2		19.34	ANGEL	N	8/3/97 5:05	ANGEL	N	8/4/97 1:20	20.25	Y	Y	40	2.07	39	2.02	1604.9
KAUAI	UCC	ST	2		18.20	ANGEL	N	8/4/97 4:30	ANGEL	W	8/6/97 16:15	59.75	Y	Y	40	2.20	66	3.63	1279.3
SEA-LAND CHALLENGER	UCC	ST	2		18.30	QUEEN	N	8/7/97 6:10	QUEEN	W	8/9/97 4:40	17.82	Y	No	40	2.19	66	3.61	909.4
MATSONIA	URC	ST	2		20.59	ANGEL	W	8/6/97 15:30	ANGEL	W	8/9/97 5:35	32.48	Y	No	66	3.21	66	3.21	989.3

Table B-1

Activity Data and NOx Marine Vessel Inventory for the August 3-7, 1997 Episode

		Cruise											Precautionary Zone Cruise (PZC)				
Ship Name	Cruise 80% MCR Power	Entry Cruise hp-hr	Exit Cruise hp-hr	Entry Cruise kWh	Exit Cruise kWh	NOx EMSFAC Cruise (g/kWh) or (lb/1000 gal)	Entry Cruise NOx (g)	Exit Cruise NOx (g)	Entry Cruise NOx (lbs.)	Exit Cruise NOx (lbs.)	Entry Cruise NOx (tons)	Exit Cruise NOx (tons)	Entry PZC (Y/N)	Exit PZC (Y/N)	Entry PZC Dist (nmiles)	Entry PZC Time (hours)	Exit PZC Dist (nmiles)
BEL ACE	8880	24231	27795	17822	20443	17.32	308677	354071	680	780	0.34	0.39	Y	Y	6.5	0.54	6
FARENCO	15543	45098	43971	33170	32340	17.32	574499	560137	1265	1234	0.63	0.62	Y	No	8	0.67	6
FIVI	9280	25746	25102	18936	18462	17.32	327970	319770	722	704	0.36	0.35	No	No	4.5	0.38	3.5
MODI	10480	31401	29831	23095	21940	17.32	400010	380009	881	837	0.44	0.42	Y	Y	8	0.67	6
NOSHIRO MARU	8856	28430	27719	20910	20388	17.32	362168	353114	798	778	0.40	0.39	No	Y	4.5	0.38	3.5
OTRADA	10656	27058	25705	19901	18906	17.32	344684	327450	759	721	0.38	0.36	No	Y	4.5	0.38	3.5
PERICLES C.G.	13920	40362	38344	29687	28202	17.32	514172	488463	1133	1076	0.57	0.54	No	Y	8	0.67	6
SAGACIOUS NIKE	7800	22609	22043	16629	16213	17.32	288009	280809	634	619	0.32	0.31	Y	No	8	0.67	6
SINGAPORE ACE	12640	42395	41335	31181	30402	17.32	540061	526559	1190	1160	0.59	0.58	Y	No	8	0.67	6
PACPRINCE	7600	23313	22147	17147	16289	17.32	296980	282131	654	621	0.33	0.31	Y	Y	8	0.67	6
PACPRINCESS	7600	18976	21767	13957	16010	17.32	241736	277286	532	611	0.27	0.31	Y	No	6.5	0.54	6
STAR DROTTANGER	10480	26691	29831	19631	21940	17.32	340008	380009	749	837	0.37	0.42	Y	Y	7.5	0.63	6
KARINA BONITA	8960	23443	22271	17242	16380	17.32	298640	283708	658	625	0.33	0.31	Y	Y	8	0.67	6
STAR GRIP	8096	21900	20805	16107	15302	17.32	278976	265027	614	584	0.31	0.29	Y	Y	4.5	0.38	3.5
VAIMAMA	6472	15831	18159	11644	13356	12.81	149154	171088	329	377	0.16	0.19	Y	Y	6.5	0.54	6
CHIQUITA FRANCES	12970	24230	27081	17821	19918	12.81	228293	255151	503	562	0.25	0.28	Y	No	6.5	0.54	6
MAGIC	7150	13356	14928	9824	10979	12.81	125841	140645	277	310	0.14	0.15	Y	Y	6.5	0.54	6
TUNDRA KING	10600	23297	22132	17135	16278	17.32	296773	281935	654	621	0.33	0.31	Y	Y	4.5	0.38	3.5
HOLIDAY	25578	74330	83075	54670	61102	17.32	946884	1058283	2086	2331	1.04	1.17	Y	Y	7.5	0.63	6
JUBILEE	25570	68293	76327	50229	56139	17.32	869971	972321	1916	2142	0.96	1.07	Y	Y	7.5	0.63	6
VIKING SERENADE	21600	66764	74618	49105	54882	17.32	850493	950551	1873	2094	0.94	1.05	Y	Y	7.5	0.63	6
AYA II	13504	28030	32152	20616	23648	12.81	264094	302932	582	667	0.29	0.33	Y	Y	7.5	0.63	6
BELLONA	9248	22584	22019	16610	16195	17.32	287690	280498	634	618	0.32	0.31	Y	Y	8	0.67	6
FRANCONIA	9984	21075	24174	15501	17780	17.32	268472	307953	591	678	0.30	0.34	Y	No	6.5	0.54	6
GREEN LAKE	10495	25278	24646	18592	18127	17.32	322016	313965	709	692	0.35	0.35	Y	Y	8	0.67	6
HUAL CARMENCITA	1040	2492	2429	1833	1787	17.32	31742	30949	70	68	0.03	0.03	Y	Y	4.5	0.38	3.5
OPAL RAY	9920	24091	23489	17719	17276	17.32	306890	299217	676	659	0.34	0.33	Y	No	4.5	0.38	3.5
STOLT TENACITY	13920	40021	34961	29436	25714	17.32	509824	445363	1123	981	0.56	0.49	Y	No	8	0.67	6
BT NESTOR	13439	31116	34776	22886	25578	17.32	396377	443010	873	976	0.44	0.49	No	Y	6.5	0.54	6
SAMUEL GINN	15120	50304	45100	36998	33171	17.32	640811	574520	1411	1265	0.71	0.63	Y	No	8	0.67	6
ACAPULCO	24793	42106	48298	30969	35523	17.32	536378	615257	1181	1355	0.59	0.68	Y	Y	7.5	0.63	6
ALLIGATOR BRAVERY	37568	69951	68202	51449	50163	17.32	891095	868817	1963	1914	0.98	0.96	Y	Y	4.5	0.38	3.5
APL SINGAPORE	53118	88163	85959	64844	63223	17.32	1123100	1095023	2474	2412	1.24	1.21	No	Y	4.5	0.38	3.5
AXEL MAERSK	36640	66552	64888	48949	47725	17.32	847792	826597	1867	1821	0.93	0.91	No	Y	8	0.67	6
BRISBANE STAR	23200	49745	48502	36588	35673	17.32	633699	617857	1396	1361	0.70	0.68	Y	No	4.5	0.38	3.5
BROOKLYN BRIDGE	29952	61860	60314	45498	44361	17.32	788030	768329	1736	1692	0.87	0.85	No	Y	8	0.67	6
CALIFORNIA JUPITER	23616	47185	46005	34704	33837	17.32	601081	586054	1324	1291	0.66	0.65	Y	No	4.5	0.38	3.5
CALIFORNIA SATURN	23688	40229	46145	29589	33940	17.32	512476	587840	1129	1295	0.56	0.65	Y	No	7.5	0.63	6
CAPE CHARLES	26240	44563	51117	32776	37596	17.32	567687	651171	1250	1434	0.63	0.72	No	Y	7.5	0.63	6
CHASTINE MAERSK	11398	23020	25728	16931	18923	17.32	293252	327752	646	722	0.32	0.36	Y	No	6.5	0.54	6
CHETUMAL	30834	57673	54790	42419	40298	17.32	734692	697958	1618	1537	0.81	0.77	Y	Y	4.5	0.38	3.5
DIRECT EAGLE	18239	42702	40567	31408	29837	12.81	402330	382214	886	842	0.44	0.42	Y	No	4.5	0.38	3.5
DOLE ECUADOR	16520	30568	34164	22482	25127	17.32	389397	435208	858	959	0.43	0.48	Y	Y	7.5	0.63	6
EMPRESS DRAGON	33680	63511	61923	46712	45544	17.32	809057	788830	1782	1738	0.89	0.87	Y	Y	8	0.67	6
EVER GLOWING	18544	39283	37319	28893	27448	17.32	500420	475399	1102	1047	0.55	0.52	Y	No	4.5	0.38	3.5
EVER GRADE	17280	37052	36125	27252	26570	17.32	471997	460197	1040	1014	0.52	0.51	No	Y	4.5	0.38	3.5
EVER RACER	33696	54266	60650	39913	44608	17.32	691287	772615	1523	1702	0.76	0.85	Y	No	7.5	0.63	6
EVER UNION	47608	93269	90937	68599	66884	17.32	1188141	1158437	2617	2552	1.31	1.28	No	Y	4.5	0.38	3.5
GEORGE WASHINGTON BRIDGE	22916	44933	43810	33048	32222	17.32	572399	558089	1261	1229	0.63	0.61	Y	Y	8	0.67	6
HANJIN LONDON	59595	100753	98234	74104	72251	17.32	1283474	1251387	2827	2756	1.41	1.38	Y	No	8	0.67	6
HANJIN PARIS	59595	108528	105814	79822	77826	17.32	1382517	1347955	3045	2969	1.52	1.48	No	Y	8	0.67	6
HYUNDAI DYNASTY	26048	53254	51923	39169	38189	17.32	678399	661439	1494	1457	0.75	0.73	Y	Y	8	0.67	6
HYUNDAI FREEDOM	59535	98824	96353	72685	70868	17.32	1258903	1227431	2773	2704	1.39	1.35	Y	No	8	0.67	6
HYUNDAI INDEPENDENCE	59616	101647	99106	74761	72892	17.32	1294868	1262496	2852	2781	1.43	1.39	No	Y	8	0.67	6

Table B-1

Activity Data and NOx Marine Vessel Inventory for the August 3-7, 1997 Episode

		Cruise											Precautionary Zone Cruise (PZC)				
Ship Name	Cruise 80% MCR Power	Entry Cruise hp-hr	Exit Cruise hp-hr	Entry Cruise kWh	Exit Cruise kWh	NOx EMSFAC Cruise (g/kWh) or (lb/1000 gal)	Entry Cruise NOx (g)	Exit Cruise NOx (g)	Entry Cruise NOx (lbs.)	Exit Cruise NOx (lbs.)	Entry Cruise NOx (tons)	Exit Cruise NOx (tons)	Entry PZC (Y/N)	Exit PZC (Y/N)	Entry PZC Dist (nmiles)	Entry PZC Time (hours)	Exit PZC Dist (nmiles)
LUTJENBURG	29082	56815	61787	41788	45444	17.32	723764	787093	1594	1734	0.80	0.87	No	Y	8	0.67	6
MAGLEBY MAERSK	46142	66104	75825	48620	55769	17.32	842090	965927	1855	2128	0.93	1.06	Y	Y	6.5	0.54	6
MARE CASPIUM	22000	42718	41650	31419	30634	17.32	544184	530580	1199	1169	0.60	0.58	Y	Y	8	0.67	6
MAREN MAERSK	46142	78875	74931	58012	55112	17.32	1004772	954533	2213	2102	1.11	1.05	Y	Y	8	0.67	6
MELBOURNE STAR	13680	28396	31736	20885	23342	17.32	361728	404284	797	890	0.40	0.45	No	Y	7.5	0.63	6
MING PLENTY	18952	39690	38698	29192	28462	17.32	505606	492966	1114	1086	0.56	0.54	Y	Y	4.5	0.38	3.5
MOKIHANA	34560	60899	59376	44791	43671	17.32	775780	756385	1709	1666	0.85	0.83	Y	Y	4.5	0.38	3.5
N O L RUBY	30456	56726	55308	41722	40679	17.32	722620	704555	1592	1552	0.80	0.78	No	Y	4.5	0.38	3.5
N O L ZIRCON	30456	56726	55308	41722	40679	17.32	722620	704555	1592	1552	0.80	0.78	No	Y	4.5	0.38	3.5
NEPTUNE JADE	25183	56767	53929	41752	39664	17.32	723145	686988	1593	1513	0.80	0.76	Y	Y	4.5	0.38	3.5
NYK SEABREEZE	32400	68418	66707	50321	49063	17.32	871562	849773	1920	1872	0.96	0.94	No	Y	4.5	0.38	3.5
OOCL AMERICA	52896	140122	136619	103060	100483	17.32	1784993	1740368	3932	3833	1.97	1.92	No	Y	8	0.67	6
SEA-LAND CHARGER	39671	72658	70841	53440	52104	17.32	925579	902439	2039	1988	1.02	0.99	No	Y	8	0.67	6
SEA-LAND GUATEMALA	9574	19638	21948	14444	16143	12.81	185023	206790	408	455	0.20	0.23	Y	Y	6.5	0.54	6
SEA-LAND PATRIOT	24120	56421	55011	41498	40460	17.32	718740	700771	1583	1544	0.79	0.77	Y	Y	8	0.67	6
SOVCOMFLOT SENATOR	23576	41946	48114	30851	35388	17.32	534342	612921	1177	1350	0.59	0.68	Y	Y	6.5	0.54	6
VLADIVOSTOK SENATOR	23601	41496	39421	30520	28994	17.32	528611	502180	1164	1106	0.58	0.55	Y	Y	8	0.67	6
YURIY OSTROVSKIY	7537	17193	16333	12645	12013	17.32	219014	208063	482	458	0.24	0.23	No	Y	8	0.67	6
ZIM AMERICA	23552	41903	48065	30820	35352	17.32	533798	612297	1176	1349	0.59	0.67	No	Y	6.5	0.54	6
ZIM CANADA	23552	54393	51673	40006	38005	17.32	692900	658255	1526	1450	0.76	0.72	Y	No	8	0.67	6
CHEVRON COLORADO	10000	24113	30851	17735	22691	8.58	152170	194688	335	429	0.17	0.21	Y	Y	6.5	0.54	6
CHEVRON OREGON	10000	26346	33708	19378	24792	8.58	166261	212717	366	469	0.18	0.23	Y	Y	6.5	0.54	6
		Entry Cruise FC (gals)	Exit Cruise FC (gals)			Cruise Ems Factors (lb/ 1000gal)			Entry Cruise NOx (lbs.)	Exit Cruise NOx (lbs.)	Entry Cruise NOx (tons)	Exit Cruise NOx (tons)					
ARCO INDEPENDENCE		6959	6959			55.8			388	388	0.19	0.19	Y	No	8	0.67	6
ARCO PRUDHOE BAY		3389	2960			55.8			189	165	0.09	0.08	No	Y	8	0.67	6
ARCO SAG RIVER		3446	3446			55.8			192	192	0.10	0.10	Y	No	8	0.67	6
ARCO SPIRIT		6548	5870			55.8			365	328	0.18	0.16	No	Y	8	0.67	6
BLUE RIDGE		1956	2187			55.8			109	122	0.05	0.06	Y	No	7.5	0.63	6
FREDERICKSBURG		3417	3417			55.8			191	191	0.10	0.10	Y	Y	4.5	0.38	3.5
MARINE CHEMIST		2789	2437			55.8			156	136	0.08	0.07	Y	No	4.5	0.38	3.5
EWA		3320	3237			55.8			185	181	0.09	0.09	Y	Y	4.5	0.38	3.5
KAUAI		2812	4639			55.8			157	259	0.08	0.13	Y	Y	4.5	0.38	3.5
SEA-LAND CHALLENGER		1988	3280			55.8			111	183	0.06	0.09	Y	No	8	0.67	6
MATSONIA		3171	3171			55.8			177	177	0.09	0.09	Y	No	4.5	0.38	3.5

Table B-1

Activity Data and NOx Marine Vessel Inventory for the August 3-7, 1997 Episode

		Precautionary Zone Cruise (PZC)															
Ship Name	Exit PZC Time (hours)	PZC 12 Kts/Design Speed	PZC Speed Ratio Cubed	PZC % MCR @ 12 Kts	Actual HP Llyods	PZC Power (bhp)	Entry PZC hp-hr	Exit PZC hp-hr	Entry PZC (kWh)	Exit PZC (kWh)	NOx EMSFAC PZC (g/kWh)	Entry PZC NOx (g)	Exit PZC NOx (g)	Entry PZC NOx (lbs.)	Exit PZC NOx (lbs.)	Entry PZC NOx (tons)	Exit PZC NOx (tons)
BEL ACE	0.50	96%	89%	71	11100	7932	4297	3966	3160	2917	17.48	55247	50997	122	112	0.06	0.06
FARENCO	0.50	87%	66%	53	19429	10251	6834	5125	5026	3770	17.81	89499	67124	197	148	0.10	0.07
FIVI	0.29	83%	58%	46	11600	5350	2006	1560	1476	1148	17.93	26462	20581	58	45	0.03	0.02
MODI	0.50	90%	73%	58	13100	7611	5074	3806	3732	2799	17.72	66118	49588	146	109	0.07	0.05
NOSHIRO MARU	0.29	96%	89%	71	11070	7911	2967	2307	2182	1697	17.48	38145	29668	84	65	0.04	0.03
OTRADA	0.29	76%	44%	35	13320	4710	1766	1374	1299	1010	18.13	23554	18320	52	40	0.03	0.02
PERICLES C.G.	0.50	87%	66%	53	17400	9163	6108	4581	4493	3370	17.81	79997	59998	176	132	0.09	0.07
SAGACIOUS NIKE	0.50	87%	66%	53	9750	5129	3419	2564	2515	1886	17.81	44777	33583	99	74	0.05	0.04
SINGAPORE ACE	0.50	101%	102%	81	15800	12877	8585	6438	6314	4735	17.30	109243	81932	241	180	0.12	0.09
PACPRINCE	0.50	92%	78%	62	9500	5923	3949	2961	2904	2178	17.64	51240	38430	113	85	0.06	0.04
PACPRINCESS	0.50	88%	68%	55	9500	5201	2817	2601	2072	1913	17.77	36823	33990	81	75	0.04	0.04
STAR DROTTANGER	0.50	90%	73%	58	13100	7611	4757	3806	3499	2799	17.72	61985	49588	137	109	0.07	0.05
KARINA BONITA	0.50	78%	48%	39	11200	4333	2889	2167	2125	1594	18.06	38367	28775	85	63	0.04	0.03
STAR GRIP	0.29	81%	53%	43	10120	4326	1622	1262	1193	928	17.99	21462	16693	47	37	0.02	0.02
VAIMAMA	0.50	86%	64%	51	8090	4164	2256	2082	1659	1531	13.69	22719	20971	50	46	0.03	0.02
CHIQUITA FRANCES	0.50	66%	29%	23	16213	3718	2014	1859	1481	1367	14.55	21548	19890	47	44	0.02	0.02
MAGIC	0.50	66%	29%	23	8937	2049	1110	1025	816	754	14.55	11878	10964	26	24	0.01	0.01
TUNDRA KING	0.29	66%	29%	23	13250	3038	1139	886	838	652	18.35	15381	11963	34	26	0.02	0.01
HOLIDAY	0.50	103%	108%	86	31973	27597	17248	13798	12686	10149	17.21	218350	174680	481	385	0.24	0.19
JUBILEE	0.50	94%	84%	67	31962	21418	13386	10709	9846	7877	17.55	172831	138265	381	305	0.19	0.15
VIKING SERENADE	0.50	109%	130%	104	27000	28043	17527	14021	12891	10313	16.89	217701	174161	480	384	0.24	0.19
AYA II	0.50	73%	39%	31	16880	5310	3319	2655	2441	1953	14.30	34908	27926	77	62	0.04	0.03
BELLONA	0.50	73%	39%	31	11560	3636	2424	1818	1783	1337	18.20	32457	24343	71	54	0.04	0.03
FRANCONIA	0.50	75%	41%	33	12480	4129	2236	2064	1645	1518	18.17	29881	27583	66	61	0.03	0.03
GREEN LAKE	0.50	72%	38%	30	13119	3959	2640	1980	1941	1456	18.22	35378	26533	78	58	0.04	0.03
HUAL CARMENCITA	0.29	72%	37%	30	1300	386	145	113	107	83	18.22	1941	1510	4	3	0.00	0.00
OPAL RAY	0.29	73%	39%	31	12400	3836	1439	1119	1058	823	18.20	19262	14981	42	33	0.02	0.02
STOLT TENACITY	0.50	79%	50%	40	17400	6945	4630	3472	3405	2554	18.04	61432	46074	135	101	0.07	0.05
BT NESTOR	0.50	82%	55%	44	16799	7333	3972	3667	2922	2697	17.97	52494	48456	116	107	0.06	0.05
SAMUEL GINN	0.50	92%	77%	62	18900	11689	7793	5844	5731	4299	17.64	101125	75844	223	167	0.11	0.08
ACAPULCO	0.50	60%	22%	17	30991	5339	3337	2670	2454	1963	18.46	45317	36254	100	80	0.05	0.04
ALLIGATOR BRAVERY	0.29	56%	17%	14	46960	6548	2455	1910	1806	1405	18.52	33444	26012	74	57	0.04	0.03
APL SINGAPORE	0.29	50%	12%	10	66398	6557	2459	1913	1809	1407	18.59	33623	26151	74	58	0.04	0.03
AXEL MAERSK	0.50	54%	16%	13	45800	5928	3952	2964	2907	2180	18.54	53881	40411	119	89	0.06	0.04
BRISBANE STAR	0.29	64%	27%	21	29000	6175	2316	1801	1703	1325	18.39	31323	24362	69	54	0.03	0.03
BROOKLYN BRIDGE	0.50	62%	24%	19	37440	7124	4750	3562	3493	2620	18.43	64375	48281	142	106	0.07	0.05
CALIFORNIA JUPITER	0.29	60%	22%	17	29520	5086	1907	1483	1403	1091	18.46	25900	20144	57	44	0.03	0.02
CALIFORNIA SATURN	0.50	60%	22%	17	29610	5101	3188	2551	2345	1876	18.46	43298	34638	95	76	0.05	0.04
CAPE CHARLES	0.50	60%	22%	17	32800	5651	3532	2825	2598	2078	18.46	47963	38370	106	85	0.05	0.04
CHASTINE MAERSK	0.50	71%	36%	29	14248	4128	2236	2064	1645	1518	18.24	30001	27693	66	61	0.03	0.03
CHETUMAL	0.29	56%	18%	14	38542	5448	2043	1589	1503	1169	18.52	27826	21642	61	48	0.03	0.02
DIRECT EAGLE	0.29	70%	35%	28	22799	6320	2370	1843	1743	1356	14.39	25090	19514	55	43	0.03	0.02
DOLE ECUADOR	0.50	65%	28%	22	20650	4601	2876	2301	2115	1692	18.37	38859	31087	86	68	0.04	0.03
EMPRESS DRAGON	0.50	57%	18%	14	42100	6098	4065	3049	2990	2242	18.52	55367	41525	122	91	0.06	0.05
EVER GLOWING	0.29	64%	26%	21	23180	4760	1785	1388	1313	1021	18.39	24143	18778	53	41	0.03	0.02
EVER GRADE	0.29	64%	27%	21	21600	4599	1725	1341	1269	987	18.39	23330	18146	51	40	0.03	0.02
EVER RACER	0.50	57%	18%	15	42120	6188	3867	3094	2844	2276	18.50	52622	42098	116	93	0.06	0.05
EVER UNION	0.29	59%	20%	16	59510	9665	3624	2819	2666	2073	18.48	49270	38321	109	84	0.05	0.04
GEORGE WASHINGTON BRIDGE	0.50	59%	20%	16	28645	4664	3110	2332	2287	1715	18.48	42270	31703	93	70	0.05	0.03
HANJIN LONDON	0.50	51%	13%	10	74494	7775	5183	3888	3812	2859	18.59	70873	53155	156	117	0.08	0.06
HANJIN PARIS	0.50	55%	16%	13	74494	9718	6478	4859	4765	3574	18.54	88322	66241	195	146	0.10	0.07
HYUNDAI DYNASTY	0.50	61%	23%	18	32560	6010	4007	3005	2947	2210	18.45	54359	40769	120	90	0.06	0.04
HYUNDAI FREEDOM	0.50	50%	12%	10	74419	7352	4901	3676	3605	2704	18.59	67015	50261	148	111	0.07	0.06
HYUNDAI INDEPENDENCE	0.50	51%	13%	11	74520	7979	5319	3989	3912	2934	18.57	72656	54492	160	120	0.08	0.06

Table B-1

Activity Data and NOx Marine Vessel Inventory for the August 3-7, 1997 Episode

		Precautionary Zone Cruise (PZC)															
Ship Name	Exit PZC Time (hours)	PZC 12 Kts/Design Speed	PZC Speed Ratio Cubed	PZC % MCR @ 12 Kts	Actual HP Llyods	PZC Power (bhp)	Entry PZC hp-hr	Exit PZC hp-hr	Entry PZC (kWh)	Exit PZC (kWh)	NOx EMSFAC PZC (g/kWh)	Entry PZC NOx (g)	Exit PZC NOx (g)	Entry PZC NOx (lbs.)	Exit PZC NOx (lbs.)	Entry PZC NOx (tons)	Exit PZC NOx (tons)
LUTJENBURG	0.50	59%	20%	16	36353	5855	3903	2927	2871	2153	18.48	53057	39793	117	88	0.06	0.04
MAGLEBY MAERSK	0.50	51%	13%	10	57677	5965	3231	2982	2376	2194	18.59	44177	40779	97	90	0.05	0.04
MARE CASPIUM	0.50	58%	20%	16	27500	4349	2899	2174	2132	1599	18.48	39410	29557	87	65	0.04	0.03
MAREN MAERSK	0.50	51%	13%	11	57677	6223	4149	3111	3051	2288	18.57	56668	42501	125	94	0.06	0.05
MELBOURNE STAR	0.50	73%	39%	31	17100	5379	3362	2689	2473	1978	18.20	45011	36009	99	79	0.05	0.04
MING PLENTY	0.29	63%	25%	20	23690	4700	1763	1371	1296	1008	18.22	23623	18373	52	40	0.03	0.02
MOKIHANA	0.29	53%	15%	12	43200	5106	1915	1489	1408	1095	18.55	26127	20321	58	45	0.03	0.02
N O L RUBY	0.29	56%	17%	14	38070	5313	1992	1550	1465	1140	18.52	27137	21107	60	46	0.03	0.02
N O L ZIRCON	0.29	56%	17%	14	38070	5313	1992	1550	1465	1140	18.52	27137	21107	60	46	0.03	0.02
NEPTUNE JADE	0.29	68%	31%	25	31479	7788	2921	2272	2148	1671	18.32	39343	30600	87	67	0.04	0.03
NYK SEABREEZE	0.29	63%	25%	20	40500	8237	3089	2403	2272	1767	18.41	41826	32531	92	72	0.05	0.04
OOCL AMERICA	0.50	79%	50%	40	66120	26548	17699	13274	13017	9763	18.04	234835	176127	517	388	0.26	0.19
SEA-LAND CHARGER	0.50	55%	17%	13	49589	6581	4387	3290	3227	2420	18.54	59809	44857	132	99	0.07	0.05
SEA-LAND GUATEMALA	0.50	72%	38%	30	11968	3632	1967	1816	1447	1336	14.33	20740	19145	46	42	0.02	0.02
SEA-LAND PATRIOT	0.50	70%	35%	28	30150	8336	5557	4168	4087	3065	18.26	74632	55974	164	123	0.08	0.06
SOVCOMFLOT SENATOR	0.50	63%	25%	20	29470	5838	3162	2919	2326	2147	18.41	42815	39522	94	87	0.05	0.04
VLADIVOSTOK SENATOR	0.50	53%	15%	12	29501	3464	2309	1732	1698	1274	18.55	31510	23633	69	52	0.03	0.03
YURIY OSTROVSKIY	0.50	68%	32%	26	9421	2416	1610	1208	1184	888	18.30	21672	16254	48	36	0.02	0.02
ZIM AMERICA	0.50	63%	25%	20	29440	5832	3159	2916	2323	2145	18.41	42772	39482	94	87	0.05	0.04
ZIM CANADA	0.50	69%	33%	27	29440	7833	5222	3916	3841	2881	18.28	70206	52654	155	116	0.08	0.06
CHEVRON COLORADO	0.50	85%	62%	49	12500	6164	3339	3082	2456	2267	*9.43*	23159	21377	51	47	0.03	0.02
CHEVRON OREGON	0.50	93%	80%	64	12500	8040	4355	4020	3203	2957	*9.43*	30206	27883	67	61	0.03	0.03
					RFC @ Full (80%) Power (gal/hr)												
ARCO INDEPENDENCE	0.50	92%	77%	62	2093.4	1614	1076	807			55.8			60	45	0.03	0.02
ARCO PRUDHOE BAY	0.50	75%	43%	34	1238.6	532	355	266			55.8			20	15	0.01	0.01
ARCO SAG RIVER	0.50	84%	60%	48	1128.1	675	450	338			55.8			25	19	0.01	0.01
ARCO SPIRIT	0.50	86%	64%	51	2093.4	1345	896	672			55.8			50	38	0.03	0.02
BLUE RIDGE	0.50	87%	66%	53	793.8	523	327	261			55.8			18	15	0.01	0.01
FREDERICKSBURG	0.29	76%	44%	35	1238.6	546	205	159			55.8			11	9	0.0057	0.0044
MARINE CHEMIST	0.29	76%	43%	35	1017.6	440	165	128			55.8			9	7	0.0046	0.0036
EWA	0.29	62%	24%	19	1604.9	384	144	112			55.8			8	6	0.0040	0.0031
KAUAI	0.29	66%	29%	23	1279.3	367	138	107			55.8			8	6	0.0038	0.0030
SEA-LAND CHALLENGER	0.50	66%	28%	23	909.4	257	171	128			55.8			10	7	0.0048	0.0036
MATSONIA	0.29	58%	20%	16	989.3	196	73	57			55.8			4	3	0.0020	0.0016

Table B-1

Activity Data and NOx Marine Vessel Inventory for the August 3-7, 1997 Episode

	Maneuvering				Maneuvering															
Ship Name	Entry Manvg (Y/N)	Exit Manvg (Y/N)	Entry Manvg (hrs)	Exit Manvg (hrs)	(Hrs at port-Mane) Hotelling (hrs)	Actual HP Llyods	% MCR @ 5 kts Manvg	Manvg Power (bhp)	Entry Manvg power hp-hr	Exit Manvg power hp-hr	Entry Manvg power (kWh)	Exit Manvg power (kWh)	NOx EMSFAC Manvg (g/kWh)	Entry Manvg NOx (g)	Exit Manvg NOx (g)	Entry Manvg NOx (lbs.)	Exit Manvg NOx (lbs.)	Entry Manvg NOx (tons)	Exit Manvg NOx (tons)	Aux. Entry All Cruise (Y/N)
BEL ACE	Y	Y	0.33	0.58	3.51	11100	20	2220	733	1288	539	947	18.41	9920	17435	22	38	0.01	0.02	Y
FARENCO	Y	No	0.35	2.58	102.88	19429	20	3886	1360	10025	1000	7374	18.41	18416	135749	41	299	0.02	0.15	Y
FIVI	No	No	1.67	1.50	119.98	11600	20	2320	3867	3480	2844	2560	18.41	52357	47121	115	104	0.06	0.05	No
MODI	Y	Y	0.42	0.38	10.70	13100	20	2620	1092	1004	803	739	18.41	14782	13599	33	30	0.02	0.01	Y
NOSHIRO MARU	No	Y	0.92	0.50	89.33	11070	20	2214	2030	1107	1493	814	18.41	27481	14989	61	33	0.03	0.02	No
OTRADA	No	Y	1.17	0.75	13.50	13320	20	2664	3108	1998	2286	1470	18.41	42084	27054	93	60	0.05	0.03	No
PERICLES C.G.	No	Y	1.25	0.73	18.85	17400	20	3480	4350	2552	3199	1877	18.41	58901	34555	130	76	0.06	0.04	No
SAGACIOUS NIKE	Y	No	0.72	1.25	80.02	9750	20	1950	1398	2438	1028	1793	18.41	18923	33005	42	73	0.02	0.04	Y
SINGAPORE ACE	Y	No	0.50	1.25	45.90	15800	20	3160	1580	3950	1162	2905	18.41	21394	53485	47	118	0.02	0.06	Y
PACPRINCE	Y	Y	0.50	1.25	19.83	9500	20	1900	950	2375	699	1747	18.41	12864	32159	28	71	0.01	0.04	Y
PACPRINCESS	Y	No	1.25	1.25	33.07	9500	20	1900	2375	2375	1747	1747	18.41	32159	32159	71	71	0.04	0.04	Y
STAR DROTTANGER	Y	Y	1.33	0.67	38.50	13100	20	2620	3493	1747	2569	1285	18.41	47302	23651	104	52	0.05	0.03	Y
KARINA BONITA	Y	Y	0.42	0.93	42.48	11200	20	2240	933	2091	686	1538	18.41	12638	28309	28	62	0.01	0.03	Y
STAR GRIP	Y	Y	1.17	0.67	6.42	10120	20	2024	2361	1349	1737	992	18.41	31974	18271	70	40	0.04	0.02	Y
VAIMAMA	Y	Y	0.83	0.42	18.58	8090	20	1618	1348	674	992	496	14.64	14518	7259	32	16	0.02	0.01	Y
CHIQUITA FRANCES	Y	No	1.58	0.50	18.48	16213	15	2432	3851	1216	2832	894	14.79	41887	13227	92	29	0.05	0.01	Y
MAGIC	Y	Y	0.88	0.90	19.38	8937	15	1341	1184	1206	871	887	14.79	12881	13124	28	29	0.01	0.01	Y
TUNDRA KING	Y	Y	0.67	0.58	11.67	13250	15	1988	1325	1159	975	853	18.5	18029	15775	40	35	0.02	0.02	Y
HOLIDAY	Y	Y	0.75	0.50	10.75	31973	15	4796	3597	2398	2646	1764	18.5	48943	32629	108	72	0.05	0.04	Y
JUBILEE	Y	Y	0.90	0.48	8.87	31962	15	4794	4315	2317	3174	1704	18.5	58711	31530	129	69	0.06	0.03	Y
VIKING SÈRENADE	Y	Y	1.00	0.47	9.62	27000	15	4050	4050	1890	2979	1390	18.5	55107	25717	121	57	0.06	0.03	Y
AYA II	Y	Y	1.58	0.83	6.25	16880	15	2532	4009	2110	2949	1552	14.79	43610	22953	96	51	0.05	0.03	Y
BELLONA	Y	Y	0.03	0.75	18.97	11560	15	1734	58	1301	43	957	18.5	786	17696	2	39	0.00	0.02	Y
FRANCONIA	Y	No	1.07	0.72	2.08	12480	15	1872	1997	1342	1469	987	18.5	27170	18255	60	40	0.03	0.02	Y
GREEN LAKE	Y	Y	1.25	0.83	17.50	13119	15	1968	2460	1640	1809	1206	18.5	33470	22313	74	49	0.04	0.02	Y
HUAL CARMENCITA	Y	Y	1.33	0.72	11.95	1300	15	195	260	140	191	103	18.5	3538	1902	8	4	0.00	0.00	Y
OPAL RAY	Y	No	1.17	0.75	97.98	12400	15	1860	2170	1395	1596	1026	18.5	29527	18981	65	42	0.03	0.02	Y
STOLT TENACITY	Y	No	0.25	0.75	52.23	17400	20	3480	870	2610	640	1920	18.5	11838	35514	26	78	0.01	0.04	Y
BT NESTOR	No	Y	0.78	0.38	27.20	16799	15	2520	1974	966	1452	710	18.5	26858	13143	59	29	0.03	0.01	No
SAMUEL GINN	Y	No	0.75	0.75	23.90	18900	15	2835	2126	2126	1564	1564	18.5	28931	28931	64	64	0.03	0.03	Y
ACAPULCO	Y	Y	4.00	0.42	33.50	30991	10	3099	12396	1291	9118	950	18.59	169495	17656	373	39	0.19	0.02	Y
ALLIGATOR BRAVERY	Y	Y	1.33	0.92	41.50	46960	10	4696	6261	4305	4605	3166	18.59	85611	58857	189	130	0.09	0.06	Y
APL SINGAPORE	No	Y	0.73	0.47	75.20	66398	10	6640	4869	3099	3581	2279	18.59	66576	42367	147	93	0.07	0.05	No
AXEL MAERSK	No	Y	0.67	0.45	19.30	45800	10	4580	3053	2061	2246	1516	18.59	41748	28180	92	62	0.05	0.03	No
BRISBANE STAR	Y	No	1.25	1.17	10.15	29000	10	2900	3625	3383	2666	2488	18.59	49564	46260	109	102	0.05	0.05	Y
BROOKLYN BRIDGE	No	Y	0.88	0.48	40.93	37440	10	3744	3307	1810	2432	1331	18.59	45219	24743	100	54	0.05	0.03	No
CALIFORNIA JUPITER	Y	No	1.00	1.08	18.23	29520	10	2952	2952	3198	2171	2352	18.59	40363	43726	89	96	0.04	0.05	Y
CALIFORNIA SATURN	Y	No	1.75	0.83	8.40	29610	10	2961	5182	2468	3811	1815	18.59	70850	33738	156	74	0.08	0.04	Y
CAPE CHARLES	No	Y	0.95	0.77	2.40	32800	10	3280	3116	2515	2292	1850	18.59	42605	34383	94	76	0.05	0.04	No
CHASTINE MAERSK	Y	No	0.83	0.33	50.07	14248	10	1425	1187	475	873	349	18.59	16234	6494	36	14	0.02	0.01	Y
CHETUMAL	Y	Y	0.58	0.17	36.50	38542	10	3854	2248	642	1654	472	18.59	30741	8783	68	19	0.03	0.01	Y
DIRECT EAGLE	Y	No	0.67	0.37	40.23	22799	10	2280	1520	836	1118	615	14.94	16702	9186	37	20	0.02	0.01	Y
DOLE ECUADOR	Y	Y	1.00	0.80	29.20	20650	10	2065	2065	1652	1519	1215	18.59	28235	22588	62	50	0.03	0.02	Y
EMPRESS DRAGON	Y	Y	0.73	0.25	47.77	42100	10	4210	3087	1053	2271	774	18.59	42213	14391	93	32	0.05	0.02	Y
EVER GLOWING	Y	No	1.00	0.48	5.65	23180	10	2318	2318	1120	1705	824	18.59	31694	15319	70	34	0.03	0.02	Y
EVER GRADE	No	Y	0.92	0.42	28.67	21600	10	2160	1980	900	1456	662	18.59	27072	12306	60	27	0.03	0.01	No
EVER RACER	Y	No	0.83	1.00	17.98	42120	10	4212	3510	4212	2582	3098	18.59	47992	57590	106	127	0.05	0.06	Y
EVER UNION	No	Y	1.08	0.50	44.00	59510	10	5951	6447	2976	4742	2188	18.59	88148	40684	194	90	0.10	0.04	No
GEORGE WASHINGTON BRIDGE	Y	Y	0.78	0.45	69.02	28645	10	2865	2244	1289	1650	948	18.59	30680	17625	68	39	0.03	0.02	Y
HANJIN LONDON	Y	No	1.12	0.83	0.28	74494	10	7449	8318	6208	6118	4566	18.59	113738	84879	251	187	0.13	0.09	Y
HANJIN PARIS	No	Y	0.92	0.92	13.00	74494	10	7449	6829	6829	5022	5022	18.59	93367	93367	206	206	0.10	0.10	No
HYUNDAI DYNASTY	Y	Y	0.95	0.95	43.52	32560	10	3256	3093	3093	2275	2275	18.59	42293	42293	93	93	0.05	0.05	Y
HYUNDAI FREEDOM	Y	No	1.67	0.95	2.82	74419	10	7442	12403	7070	9123	5200	18.59	169588	96665	374	213	0.19	0.11	Y
HYUNDAI INDEPENDENCE	No	Y	0.87	2.33	13.00	74520	10	7452	6458	17388	4750	12789	18.59	88305	237745	195	524	0.10	0.26	No

Table B-1

Activity Data and NOx Marine Vessel Inventory for the August 3-7, 1997 Episode

	Maneuvering				Maneuvering																
Ship Name	Entry Manvg (Y/N)	Exit Manvg (Y/N)	Entry Manvg (hrs)	Exit Manvg (hrs)	(Hrs at port-Mane) Hotelling (hrs)	Actual HP Llyods	% MCR @ 5 kts Manvg	Manvg Power (bhp)	Entry Manvg power hp-hr	Exit Manvg power hp-hr	Entry Manvg power (kWh)	Exit Manvg power (kWh)	NOx EMSFAC Manvg (g/kWh)	Entry Manvg NOx (g)	Exit Manvg NOx (g)	Entry Manvg NOx (lbs.)	Exit Manvg NOx (lbs.)	Entry Manvg NOx (tons)	Exit Manvg NOx (tons)	Aux. Entry All Cruise (Y/N)
LUTJENBURG	No	Y	0.67	0.25	6.50	36353	10	3635	2424	909	1783	668	18.59	33137	12426	73	27	0.04	0.01	No
MAGLEBY MAERSK	Y	Y	0.58	0.33	21.67	57677	10	5768	3364	1923	2475	1414	18.59	46003	26287	101	58	0.05	0.03	Y
MARE CASPIUM	Y	Y	0.75	0.73	37.43	27500	10	2750	2063	2017	1517	1483	18.59	28200	27574	62	61	0.03	0.03	Y
MAREN MAERSK	Y	Y	0.73	0.38	13.30	57677	10	5768	4230	2211	3111	1626	18.59	57832	30230	127	67	0.06	0.03	Y
MELBOURNE STAR	No	Y	0.85	0.83	42.08	17100	10	1710	1454	1425	1069	1048	18.59	19874	19484	44	43	0.02	0.02	No
MING PLENTY	Y	Y	1.08	1.00	63.58	23690	10	2369	2566	2369	1888	1742	18.59	35090	32391	77	71	0.04	0.04	Y
MOKIHANA	Y	Y	0.75	0.72	38.62	43200	10	4320	3240	3096	2383	2277	18.59	44300	42331	98	93	0.05	0.05	Y
N O L RUBY	No	Y	0.92	0.90	41.10	38070	10	3807	3490	3426	2567	2520	18.59	47715	46848	105	103	0.05	0.05	No
N O L ZIRCON	No	Y	0.95	0.95	74.72	38070	10	3807	3617	3617	2660	2660	18.59	49450	49450	109	109	0.05	0.05	No
NEPTUNE JADE	Y	Y	1.08	0.62	10.80	31479	10	3148	3410	1941	2508	1428	18.59	46628	26542	103	58	0.05	0.03	Y
NYK SEABREEZE	No	Y	1.10	0.92	19.25	40500	10	4050	4455	3713	3277	2731	18.59	60913	50761	134	112	0.07	0.06	No
OOCL AMERICA	No	Y	0.67	0.70	76.80	66120	10	6612	4408	4628	3242	3404	18.59	60270	63284	133	139	0.07	0.07	No
SEA-LAND CHARGER	No	Y	0.62	0.42	26.00	49589	10	4959	3058	2066	2249	1520	18.59	41812	28251	92	62	0.05	0.03	No
SEA-LAND GUATEMALA	Y	Y	0.55	0.38	15.32	11968	10	1197	658	459	484	337	14.94	7233	5041	16	11	0.01	0.01	Y
SEA-LAND PATRIOT	Y	Y	0.85	2.25	55.82	30150	10	3015	2563	6784	1885	4989	18.59	35040	92754	77	204	0.04	0.10	Y
SOVCOMFLOT SENATOR	Y	Y	0.67	0.42	28.92	29470	10	2947	1965	1228	1445	903	18.59	26863	16789	59	37	0.03	0.02	Y
VLADIVOSTOK SENATOR	Y	Y	0.60	0.50	33.65	29501	10	2950	1770	1475	1302	1085	18.59	24202	20168	53	44	0.03	0.02	Y
YURIY OSTROVSKIY	No	Y	0.67	0.47	1.53	9421	10	942	628	440	462	323	18.59	8588	6011	19	13	0.01	0.01	No
ZIM AMERICA	No	Y	0.82	0.72	17.37	29440	10	2944	2404	2110	1768	1552	18.59	32873	28848	72	64	0.04	0.03	No
ZIM CANADA	Y	No	0.57	0.55	7.17	29440	10	2944	1668	1619	1227	1191	18.59	22810	22139	50	49	0.03	0.02	Y
CHEVRON COLORADO	Y	Y	1.03	0.75	35.30	12500	15	1875	1938	1406	1425	1034	18.5	26363	19134	58	42	0.03	0.02	Y
CHEVRON OREGON	Y	Y	0.75	0.75	0.17	12500	15	1875	1406	1406	1034	1034	18.5	19134	19134	42	42	0.02	0.02	Y
						RFC @ Full (80%) Power (gal/hr)		RFC @ %MCR Manvg (gal/hr)	Entry Manvg FC (gals)	Exit Manvg FC (gals)			Cruise Ems Factors (lb/ 1000gal)			Entry Manvg NOx (lbs.)	Exit Manvg NOx (lbs.)	Entry Manvg PZC NOx (tons)	Exit Manvg NOx (tons)	
ARCO INDEPENDENCE	Y	No	1.05	0.75	23.43	2093.4	15	392.5125	412	294			55.8			23	16	0.01	0.01	Y
ARCO PRUDHOE BAY	No	Y	0.75	0.75	43.83	1238.6	15	232.2375	174	174			55.8			10	10	0.00	0.00	No
ARCO SAG RIVER	Y	No	1.40	0.60	47.60	1128.1	15	211.5188	296	127			55.8			17	7	0.01	0.00	Y
ARCO SPIRIT	No	Y	1.55	0.75	17.25	2093.4	15	392.5125	608	294			55.8			34	16	0.02	0.01	No
BLUE RIDGE	Y	No	1.00	0.75	57.23	793.8	15	148.8375	149	112			55.8			8	6	0.00	0.00	Y
FREDERICKSBURG	Y	Y	1.00	0.75	47.33	1238.6	15	232.2375	232	174			55.8			13	10	0.01	0.00	Y
MARINE CHEMIST	Y	No	0.38	0.75	22.10	1017.6	15	190.8	73	143			55.8			4	8	0.00	0.00	Y
EWA	Y	Y	1.25	1.25	17.75	1604.9	10	200.6125	251	251			55.8			14	14	0.01	0.01	Y
KAUAI	Y	Y	1.00	0.95	57.80	1279.3	10	159.9125	160	152			55.8			9	8	0.00	0.00	Y
SEA-LAND CHALLENGER	Y	No	0.47	0.60	17.35	909.4	10	113.675	53	68			55.8			3	4	0.00	0.00	Y
MATSONIA	Y	No	1.50	1.18	30.98	989.3	10	123.6625	185	146			55.8			10	8	0.01	0.00	Y
																		3.5	2.9	

Table B-1

Activity Data and NOx Marine Vessel Inventory for the August 3-7, 1997 Episode

	Auxiliary Boiler All Cruise					Auxiliary Boiler All Cruise			Auxiliary Boiler-Hotelling & Manvg				Generators						
Ship Name	Aux. Exit All Cruise (Y/N)	Entry All Cruise Time (hrs)	Exit All Cruise Time (hrs)	EMSFAC All Cruise (1b/hr)	Entry All Cruise NOx (lbs.)	Exit All Cruise NOx (lbs.)	Entry All Cruise NOx (tons)	Exit All Cruise NOx (tons)	Aug 3-7th only-Hrs at Port	EMSFAC Hotelling +Manvg (lb/hour)	Hotelling+ Manvg NOx (lbs.)	Hotelling+ Manvg NOx (tons)	Entry Cruise NOx (tons)	Exit Cruise NOx (tons)	Entry PZC NOx (tons)	Exit PZC NOx (tons)	Entry Manvg NOx (tons)	Exit Manvg NOx (tons)	Entry Cruise NOx (tons)
BEL ACE	Y	3.27	3.63	2.7	8.83	9.80	0.004	0.005	4.4	2.7	12	0.006	0.015	0.018	0.003	0.003	0.002	0.003	0.015
FARENCO	No	3.57	3.33	2.7	9.63	8.99	0.005	0.004	103.2	2.7	279	0.139	0.016	0.016	0.004	0.003	0.002	0.015	0.016
FIVI	No	3.15	3.00	2.7	8.50	8.09	0.004	0.004	120.0	2.7	324	0.162	0.013	0.012	0.002	0.001	0.008	0.007	
MODI	Y	3.66	3.35	2.7	9.89	9.04	0.005	0.005	11.5	2.7	31	0.016	0.017	0.016	0.004	0.003	0.002	0.002	0.017
NOSHIRO MARU	Y	3.59	3.42	2.7	9.68	9.24	0.005	0.005	89.8	2.7	243	0.121	0.018	0.018	0.002	0.002	0.005	0.003	
OTRADA	Y	2.91	2.70	2.7	7.87	7.30	0.004	0.004	14.3	2.7	38	0.019	0.016	0.016	0.002	0.002	0.008	0.005	
PERICLES C.G.	Y	3.57	3.25	2.7	9.63	8.79	0.005	0.004	19.6	2.7	53	0.026	0.014	0.014	0.003	0.002	0.006	0.004	
SAGACIOUS NIKE	No	3.57	3.33	2.7	9.63	8.98	0.005	0.004	80.7	2.7	218	0.109	0.016	0.016	0.004	0.003	0.004	0.007	0.016
SINGAPORE ACE	No	4.02	3.77	2.7	10.86	10.18	0.005	0.005	46.4	2.7	125	0.063	0.024	0.024	0.005	0.004	0.004	0.009	0.024
PACPRINCE	Y	3.73	3.41	2.7	10.08	9.22	0.005	0.005	21.6	2.7	58	0.029	0.019	0.018	0.004	0.003	0.003	0.008	0.019
PACPRINCESS	No	3.04	3.36	2.7	8.20	9.08	0.004	0.005	34.3	2.7	93	0.046	0.015	0.018	0.003	0.003	0.008	0.008	0.015
STAR DROTTANGER	Y	3.17	3.35	2.7	8.56	9.04	0.004	0.005	40.5	2.7	109	0.055	0.020	0.022	0.005	0.004	0.011	0.005	0.020
KARINA BONITA	Y	3.28	2.99	2.7	8.86	8.06	0.004	0.004	43.8	2.7	118	0.059	0.013	0.012	0.003	0.002	0.002	0.005	0.013
STAR GRIP	Y	3.08	2.86	2.7	8.32	7.73	0.004	0.004	8.3	2.7	22	0.011	0.024	0.023	0.003	0.003	0.011	0.006	0.024
VAIMAMA	Y	2.99	3.31	2.7	8.07	8.93	0.004	0.004	19.8	2.7	54	0.027	0.025	0.029	0.006	0.005	0.008	0.004	0.025
CHIQUITA FRANCES	No	2.41	2.59	2.7	6.51	6.99	0.003	0.003	20.1	2.7	54	0.027	0.035	0.039	0.010	0.009	0.029	0.009	0.035
MAGIC	Y	2.41	2.59	2.7	6.51	6.99	0.003	0.003	21.2	2.7	57	0.029	0.027	0.030	0.008	0.007	0.013	0.013	0.027
TUNDRA KING	Y	2.57	2.38	2.7	6.95	6.42	0.003	0.003	12.9	2.7	35	0.017	0.023	0.022	0.004	0.003	0.007	0.006	0.023
HOLIDAY	Y	3.53	3.75	2.7	9.53	10.12	0.005	0.005	12.0	2.7	32	0.016	0.098	0.110	0.021	0.017	0.025	0.017	0.098
JUBILEE	Y	3.30	3.49	2.7	8.90	9.41	0.004	0.005	10.2	2.7	28	0.014	0.090	0.101	0.021	0.017	0.030	0.016	0.090
VIKING SERENADE	Y	3.72	3.95	2.7	10.03	10.68	0.005	0.005	11.1	2.7	30	0.015	0.077	0.086	0.016	0.012	0.025	0.012	0.077
AYA II	Y	2.70	2.88	2.7	7.29	7.78	0.004	0.004	8.7	2.7	23	0.012	0.014	0.016	0.004	0.003	0.010	0.005	0.014
BELLONA	Y	3.11	2.88	2.7	8.39	7.78	0.004	0.004	19.8	2.7	53	0.027	0.028	0.027	0.008	0.006	0.000	0.008	0.028
FRANCONIA	No	2.65	2.92	2.7	7.16	7.89	0.004	0.004	3.1	2.7	9	0.004	0.018	0.021	0.005	0.004	0.009	0.006	0.018
GREEN LAKE	Y	3.08	2.85	2.7	8.30	7.69	0.004	0.004	19.6	2.7	53	0.026	0.026	0.025	0.007	0.005	0.013	0.009	0.026
HUAL CARMENCITA	Y	2.77	2.63	2.7	7.48	7.09	0.004	0.004	14.0	2.7	38	0.019	0.024	0.023	0.004	0.003	0.013	0.007	0.024
OPAL RAY	No	2.80	2.66	2.7	7.57	7.18	0.004	0.004	99.1	2.7	268	0.134	0.011	0.011	0.002	0.001	0.005	0.003	0.011
STOLT TENACITY	No	3.54	3.01	2.7	9.56	8.13	0.005	0.004	52.5	2.7	142	0.071	0.028	0.024	0.006	0.005	0.002	0.007	0.028
BT NESTOR	Y	2.86	3.09	2.7	7.71	8.34	0.004	0.004	27.6	2.7	74	0.037	0.020	0.022	0.005	0.004	0.007	0.003	
SAMUEL GINN	No	3.99	3.48	2.7	10.78	9.40	0.005	0.005	24.7	2.7	67	0.033	0.034	0.030	0.007	0.005	0.008	0.008	0.034
ACAPULCO	Y	2.32	2.45	2.7	6.27	6.61	0.003	0.003	37.9	2.7	102	0.051	0.020	0.023	0.007	0.006	0.048	0.005	0.020
ALLIGATOR BRAVERY	Y	2.24	2.11	2.7	6.04	5.69	0.003	0.003	43.8	2.7	118	0.059	0.029	0.029	0.006	0.005	0.021	0.014	0.029
APL SINGAPORE	Y	2.03	1.91	2.7	5.49	5.16	0.003	0.003	75.7	2.7	204	0.102	0.047	0.046	0.011	0.008	0.021	0.013	
AXEL MAERSK	Y	2.48	2.27	2.7	6.70	6.13	0.003	0.003	19.7	2.7	53	0.027	0.031	0.030	0.011	0.008	0.011	0.008	
BRISBANE STAR	No	2.52	2.38	2.7	6.80	6.43	0.003	0.003	11.4	2.7	31	0.015	0.023	0.023	0.004	0.003	0.014	0.013	0.023
BROOKLYN BRIDGE	Y	2.73	2.51	2.7	7.38	6.79	0.004	0.003	41.4	2.7	112	0.056	0.028	0.027	0.009	0.007	0.012	0.007	
CALIFORNIA JUPITER	No	2.37	2.24	2.7	6.41	6.05	0.003	0.003	19.2	2.7	52	0.026	0.023	0.022	0.004	0.003	0.011	0.012	0.023
CALIFORNIA SATURN	No	2.32	2.45	2.7	6.27	6.61	0.003	0.003	10.1	2.7	27	0.014	0.019	0.022	0.007	0.006	0.020	0.009	0.019
CAPE CHARLES	Y	2.32	2.45	2.7	6.27	6.61	0.003	0.003	3.2	2.7	9	0.004	0.021	0.024	0.008	0.006	0.012	0.010	
CHASTINE MAERSK	No	2.56	2.76	2.7	6.92	7.44	0.003	0.004	50.9	2.7	137	0.069	0.028	0.032	0.008	0.007	0.012	0.005	0.028
CHETUMAL	Y	2.25	2.07	2.7	6.06	5.59	0.003	0.003	37.3	2.7	101	0.050	0.028	0.027	0.006	0.004	0.009	0.003	0.028
DIRECT EAGLE	No	2.72	2.52	2.7	7.33	6.79	0.004	0.003	40.9	2.7	110	0.055	0.021	0.020	0.003	0.003	0.006	0.003	0.021
DOLE ECUADOR	Y	2.48	2.57	2.7	6.68	6.93	0.003	0.003	31.0	2.7	84	0.042	0.028	0.032	0.010	0.008	0.015	0.012	0.028
EMPRESS DRAGON	Y	2.55	2.34	2.7	6.89	6.31	0.003	0.003	48.8	2.7	132	0.066	0.028	0.027	0.010	0.007	0.011	0.004	0.028
EVER GLOWING	No	2.49	2.30	2.7	6.73	6.22	0.003	0.003	6.7	2.7	18	0.009	0.020	0.019	0.003	0.003	0.009	0.004	0.020
EVER GRADE	Y	2.52	2.38	2.7	6.80	6.43	0.003	0.003	29.1	2.7	79	0.039	0.017	0.017	0.003	0.002	0.007	0.003	
EVER RACER	No	2.24	2.30	2.7	6.04	6.21	0.003	0.003	18.8	2.7	51	0.025	0.025	0.028	0.010	0.008	0.013	0.015	0.025
EVER UNION	Y	2.33	2.20	2.7	6.30	5.94	0.003	0.003	44.5	2.7	120	0.060	0.039	0.038	0.007	0.006	0.022	0.010	
GEORGE WASHINGTON BRIDGE	Y	2.63	2.41	2.7	7.09	6.51	0.004	0.003	70.2	2.7	190	0.095	0.023	0.022	0.008	0.006	0.009	0.005	0.023
HANJIN LONDON	No	2.36	2.15	2.7	6.36	5.80	0.003	0.003	1.4	2.7	4	0.002	0.044	0.043	0.017	0.013	0.029	0.022	0.044
HANJIN PARIS	Y	2.49	2.28	2.7	6.72	6.14	0.003	0.003	13.9	2.7	38	0.019	0.047	0.046	0.017	0.013	0.024	0.024	
HYUNDAI DYNASTY	Y	2.71	2.49	2.7	7.32	6.73	0.004	0.003	45.4	2.7	123	0.061	0.031	0.030	0.010	0.008	0.014	0.014	0.031
HYUNDAI FREEDOM	No	2.33	2.12	2.7	6.28	5.72	0.003	0.003	4.5	2.7	12	0.006	0.033	0.032	0.013	0.010	0.033	0.019	0.033
HYUNDAI INDEPENDENCE	Y	2.37	2.16	2.7	6.40	5.84	0.003	0.003	15.3	2.7	41	0.021	0.034	0.033	0.013	0.010	0.017	0.047	

Table B-1

Activity Data and NOx Marine Vessel Inventory for the August 3-7, 1997 Episode

	Auxiliary Boiler All Cruise					Auxiliary Boiler All Cruise			Auxiliary Boiler-Hotelling & Manvg				Generators						
Ship Name	Aux. Exit All Cruise (Y/N)	Entry All Cruise Time (hrs)	Exit All Cruise Time (hrs)	EMSFAC All Cruise (1b/hr)	Entry All Cruise NOx (lbs.)	Exit All Cruise NOx (lbs.)	Entry All Cruise NOx (tons)	Exit All Cruise NOx (tons)	Aug 3-7th only-Hrs at Port	EMSFAC Hotelling +Manvg (lb/hour)	Hotelling+ Manvg NOx (lbs.)	Hotelling+ Manvg NOx (tons)	Entry Cruise NOx (tons)	Exit Cruise NOx (tons)	Entry PZC NOx (tons)	Exit PZC NOx (tons)	Entry Manvg NOx (tons)	Exit Manvg NOx (tons)	Entry Cruise NOx (tons)
LUTJENBURG	Y	2.62	2.62	2.7	7.07	7.09	0.004	0.004	6.8	2.7	18	0.009	0.024	0.026	0.008	0.006	0.008	0.003	
MAGLEBY MAERSK	Y	1.97	2.14	2.7	5.33	5.79	0.003	0.003	22.6	2.7	61	0.030	0.063	0.072	0.024	0.022	0.026	0.015	0.063
MARE CASPIUM	Y	2.61	2.39	2.7	7.04	6.46	0.004	0.003	38.9	2.7	105	0.053	0.023	0.022	0.008	0.006	0.009	0.009	0.023
MAREN MAERSK	Y	2.38	2.12	2.7	6.42	5.73	0.003	0.003	14.4	2.7	39	0.019	0.075	0.071	0.029	0.022	0.032	0.017	0.075
MELBOURNE STAR	Y	2.70	2.82	2.7	7.29	7.61	0.004	0.004	42.9	2.7	116	0.058	0.037	0.042	0.011	0.009	0.015	0.015	
MING PLENTY	Y	2.47	2.33	2.7	6.67	6.30	0.003	0.003	65.7	2.7	177	0.089	0.024	0.023	0.004	0.003	0.012	0.011	0.024
MOKIHANA	Y	2.14	2.01	2.7	5.77	5.43	0.003	0.003	40.1	2.7	108	0.054	0.050	0.048	0.011	0.008	0.021	0.020	0.050
N O L RUBY	Y	2.24	2.11	2.7	6.04	5.69	0.003	0.003	42.0	2.7	113	0.057	0.023	0.023	0.005	0.004	0.011	0.011	
N O L ZIRCON	Y	2.24	2.11	2.7	6.04	5.69	0.003	0.003	75.7	2.7	204	0.102	0.023	0.023	0.005	0.004	0.012	0.012	
NEPTUNE JADE	Y	2.63	2.43	2.7	7.10	6.57	0.004	0.003	12.5	2.7	34	0.017	0.025	0.024	0.004	0.003	0.012	0.007	0.025
NYK SEABREEZE	Y	2.49	2.35	2.7	6.71	6.35	0.003	0.003	20.2	2.7	54	0.027	0.036	0.035	0.006	0.005	0.019	0.016	
OOCL AMERICA	Y	3.32	3.08	2.7	8.95	8.32	0.004	0.004	77.5	2.7	209	0.105	0.063	0.061	0.016	0.012	0.016	0.017	
SEA-LAND CHARGER	Y	2.50	2.29	2.7	6.75	6.17	0.003	0.003	26.4	2.7	71	0.036	0.045	0.044	0.017	0.012	0.015	0.010	
SEA-LAND GUATEMALA	Y	2.59	2.79	2.7	7.00	7.54	0.004	0.004	16.3	2.7	44	0.022	0.032	0.036	0.008	0.008	0.009	0.006	0.032
SEA-LAND PATRIOT	Y	3.01	2.78	2.7	8.12	7.51	0.004	0.004	58.9	2.7	159	0.080	0.034	0.033	0.010	0.007	0.012	0.033	0.034
SOVCOMFLOT SENATOR	Y	2.32	2.54	2.7	6.27	6.86	0.003	0.003	30.0	2.7	81	0.041	0.024	0.028	0.007	0.007	0.009	0.006	0.024
VLADIVOSTOK SENATOR	Y	2.42	2.17	2.7	6.55	5.86	0.003	0.003	34.8	2.7	94	0.047	0.024	0.023	0.009	0.007	0.008	0.007	0.024
YURIY OSTROVSKIY	Y	2.95	2.67	2.7	7.96	7.20	0.004	0.004	2.0	2.7	5	0.003	0.026	0.024	0.008	0.006	0.008	0.005	
ZIM AMERICA	Y	2.32	2.54	2.7	6.27	6.86	0.003	0.003	18.1	2.7	49	0.024	0.025	0.029	0.008	0.007	0.011	0.010	
ZIM CANADA	No	2.98	2.69	2.7	8.04	7.27	0.004	0.004	7.7	2.7	21	0.010	0.032	0.031	0.009	0.007	0.008	0.008	0.032
									0.0										
									0.0										
CHEVRON COLORADO	Y	2.95	3.59	2.7	7.97	9.68	0.004	0.005	37.1	2.7	100	0.050	0.060	0.077	0.013	0.012	0.026	0.019	0.060
CHEVRON OREGON	Y	3.18	3.87	2.7	8.58	10.45	0.004	0.005	1.7	2.7	5	0.002	0.065	0.084	0.013	0.012	0.019	0.019	0.065
		Entry All Cruise Time (hrs)	Exit All Cruise Time (hrs)	EMSFAC All Cruise (1b/hr)	Entry All Cruise NOx (lbs.)	Exit All Cruise NOx (lbs.)	Entry All Cruise NOx (tons)	Exit All Cruise NOx (tons)		Hotelling Ems Factors (lb/ 1000gal)	RFC @ 40% power Hotelling (gal/hr)								
ARCO INDEPENDENCE	No								23.4	36.4	1047	0.446							
ARCO PRUDHOE BAY	Y								43.8	36.4	619	0.494							
ARCO SAG RIVER	No								47.6	36.4	564	0.489							
ARCO SPIRIT	Y								17.3	36.4	1047	0.329							
BLUE RIDGE	No								57.2	36.4	397	0.413							
FREDERICKSBURG	Y								47.3	36.4	619	0.534							
MARINE CHEMIST	No								22.1	36.4	509	0.205							
EWA	Y								17.8	36.4	802	0.259							
KAUAI	Y								57.8	36.4	640	0.673							
SEA-LAND CHALLENGER	No								17.3	36.4	455	0.144							
MATSONIA	No								31.0	36.4	495	0.279							
												7.542	2.3	2.4	0.6	0.5	1.0	0.8	1.7

Table B-1

Activity Data and NOx Marine Vessel Inventory for the August 3-7, 1997 Episode

	Generators					Generators		Main Engines						Auxiliary Boilers			Generators	All
Ship Name	Exit Cruise NOx (tons)	Entry PZC NOx (tons)	Exit PZC NOx (tons)	Entry Manvg NOx (tons)	Exit Manvg NOx (tons)	Hotelling NOx (tons)	Generator NOx (tons)	Entry Cruise NOx (tons)	Exit Cruise NOx (tons)	Entry PZC NOx (tons)	Exit PZC NOx (tons)	Entry Manvg NOx (tons)	Exit Manvg NOx (tons)	Entry All Cruise NOx (tons)	Exit All Cruise NOx (tons)	Hotelling+ Manvg NOx (tons)	Generators For all modes	NOx (tons) for 8/3 thru 8/7
BEL ACE	0.018	0.003	0.003	0.002	0.003	0.014	0.058	0.340	0.390	0.061	0.056	0.011	0.019	0.004	0.005	0.006	0.058	1.0
FARENCO		0.004		0.002		0.423	0.445	0.633		0.099		0.020		0.005		0.139	0.445	1.3
FIVI						0.395	0.395									0.162	0.395	0.6
MODI	0.016	0.004	0.003	0.002	0.002	0.044	0.088	0.441	0.419	0.073	0.055	0.016	0.015	0.005	0.005	0.016	0.088	1.1
NOSHIRO MARU	0.018		0.002		0.003	0.367	0.389		0.389		0.033		0.017		0.005	0.121	0.389	1.0
OTRADA	0.016		0.002		0.005	0.063	0.085		0.361		0.020		0.030		0.004	0.019	0.085	0.5
PERICLES C.G.	0.014		0.002		0.004	0.068	0.088		0.538		0.066		0.038		0.004	0.026	0.088	0.8
SAGACIOUS NIKE		0.004		0.004		0.329	0.353	0.317		0.049		0.021		0.005		0.109	0.353	0.9
SINGAPORE ACE		0.005		0.004		0.242	0.274	0.595		0.120		0.024		0.005		0.063	0.274	1.1
PACPRINCE	0.018	0.004	0.003	0.003	0.008	0.090	0.145	0.327	0.311	0.056	0.042	0.014	0.035	0.005	0.005	0.029	0.145	1.0
PACPRINCESS		0.003		0.008		0.150	0.176	0.266		0.041		0.035		0.004		0.046	0.176	0.6
STAR DROTTANGER	0.022	0.005	0.004	0.011	0.005	0.222	0.289	0.374	0.419	0.068	0.055	0.052	0.026	0.004	0.005	0.055	0.289	1.3
KARINA BONITA	0.012	0.003	0.002	0.002	0.005	0.154	0.192	0.329	0.312	0.042	0.032	0.014	0.031	0.004	0.004	0.059	0.192	1.0
STAR GRIP	0.023	0.003	0.003	0.011	0.006	0.042	0.112	0.307	0.292	0.024	0.018	0.035	0.020	0.004	0.004	0.011	0.112	0.8
VAIMAMA	0.029	0.006	0.005	0.008	0.004	0.138	0.214	0.164	0.188	0.025	0.023	0.016	0.008	0.004	0.004	0.027	0.214	0.7
CHIQUITA FRANCES		0.010		0.029		0.251	0.325	0.251		0.024		0.046		0.003		0.027	0.325	0.7
MAGIC	0.030	0.008	0.007	0.013	0.013	0.203	0.301	0.139	0.155	0.013	0.012	0.014	0.014	0.003	0.003	0.029	0.301	0.7
TUNDRA KING	0.022	0.004	0.003	0.007	0.006	0.089	0.154	0.327	0.311	0.017	0.013	0.020	0.017	0.003	0.003	0.017	0.154	0.9
HOLIDAY	0.110	0.021	0.017	0.025	0.017	0.265	0.554	1.043	1.166	0.240	0.192	0.054	0.036	0.005	0.005	0.016	0.554	3.3
JUBILEE	0.101	0.021	0.017	0.030	0.016	0.219	0.495	0.958	1.071	0.190	0.152	0.065	0.035	0.004	0.005	0.014	0.495	3.0
VIKING SERENADE	0.086	0.016	0.012	0.025	0.012	0.175	0.403	0.937	1.047	0.240	0.192	0.061	0.028	0.005	0.005	0.015	0.403	2.9
AYA II	0.016	0.004	0.003	0.010	0.005	0.030	0.082	0.291	0.334	0.038	0.031	0.048	0.025	0.004	0.004	0.012	0.082	0.9
BELLONA	0.027	0.008	0.006	0.000	0.008	0.156	0.232	0.317	0.309	0.036	0.027	0.001	0.019	0.004	0.004	0.027	0.232	1.0
FRANCONIA		0.005		0.009		0.013	0.045	0.296		0.033		0.030		0.004		0.004	0.045	0.4
GREEN LAKE	0.025	0.007	0.005	0.013	0.009	0.137	0.223	0.355	0.346	0.039	0.029	0.037	0.025	0.004	0.004	0.026	0.223	1.1
HUAL CARMENCITA	0.023	0.004	0.003	0.013	0.007	0.086	0.160	0.035	0.034	0.002	0.002	0.004	0.002	0.004	0.004	0.019	0.160	0.3
OPAL RAY		0.002		0.005		0.322	0.340	0.338		0.021		0.033		0.004		0.134	0.340	0.9
STOLT TENACITY		0.006		0.002		0.365	0.401	0.561		0.068		0.013		0.005		0.071	0.401	1.1
BT NESTOR	0.022		0.004		0.003	0.170	0.200		0.488		0.053		0.014		0.004	0.037	0.200	0.8
SAMUEL GINN		0.007		0.008		0.177	0.225	0.706		0.111		0.032		0.005		0.033	0.225	1.1
ACAPULCO	0.023	0.007	0.006	0.048	0.005	0.292	0.402	0.591	0.678	0.050	0.040	0.187	0.019	0.003	0.003	0.051	0.402	2.0
ALLIGATOR BRAVERY	0.029	0.006	0.005	0.021	0.014	0.478	0.582	0.981	0.957	0.037	0.029	0.094	0.065	0.003	0.003	0.059	0.582	2.8
APL SINGAPORE	0.046		0.008		0.013	1.546	1.613		1.206		0.029		0.047		0.003	0.102	1.613	3.0
AXEL MAERSK	0.030		0.008		0.008	0.238	0.284		0.910		0.045		0.031		0.003	0.027	0.284	1.3
BRISBANE STAR		0.004		0.014		0.080	0.121	0.698		0.034		0.055		0.003		0.015	0.121	0.9
BROOKLYN BRIDGE	0.027		0.007		0.007	0.404	0.444		0.846		0.053		0.027		0.003	0.056	0.444	1.4
CALIFORNIA JUPITER		0.004		0.011		0.150	0.188	0.662		0.029		0.044		0.003		0.026	0.188	1.0
CALIFORNIA SATURN		0.007		0.020		0.069	0.115	0.564		0.048		0.078		0.003		0.014	0.115	0.8
CAPE CHARLES	0.024		0.006		0.010	0.022	0.062		0.717		0.042		0.038		0.003	0.004	0.062	0.9
CHASTINE MAERSK		0.008		0.012		0.515	0.562	0.323		0.033		0.018		0.003		0.069	0.562	1.0
CHETUMAL	0.027	0.006	0.004	0.009	0.003	0.405	0.482	0.809	0.769	0.031	0.024	0.034	0.010	0.003	0.003	0.050	0.482	2.2
DIRECT EAGLE		0.003		0.006		0.265	0.295	0.443		0.028		0.018		0.004		0.055	0.295	0.8
DOLE ECUADOR	0.032	0.010	0.008	0.015	0.012	0.326	0.432	0.429	0.479	0.043	0.034	0.031	0.025	0.003	0.003	0.042	0.432	1.5
EMPRESS DRAGON	0.027	0.010	0.007	0.011	0.004	0.511	0.597	0.891	0.869	0.061	0.046	0.046	0.016	0.003	0.003	0.066	0.597	2.6
EVER GLOWING		0.003		0.009		0.038	0.070	0.551		0.027		0.035		0.003		0.009	0.070	0.7
EVER GRADE	0.017		0.002		0.003	0.165	0.187		0.507		0.020		0.014		0.003	0.039	0.187	0.8
EVER RACER		0.010		0.013		0.201	0.248	0.761		0.058		0.053		0.003		0.025	0.248	1.1
EVER UNION	0.038		0.006		0.010	0.640	0.694		1.276		0.042		0.045		0.003	0.060	0.694	2.1
GEORGE WASHINGTON BRIDGE	0.022	0.008	0.006	0.009	0.005	0.584	0.657	0.630	0.615	0.047	0.035	0.034	0.019	0.004	0.003	0.095	0.657	2.1
HANJIN LONDON		0.017		0.029		0.005	0.096	1.414		0.078		0.125		0.003		0.002	0.096	1.7
HANJIN PARIS	0.046		0.013		0.024	0.246	0.329		1.485		0.073		0.103		0.003	0.019	0.329	2.0
HYUNDAI DYNASTY	0.030	0.010	0.008	0.014	0.014	0.483	0.591	0.747	0.728	0.060	0.045	0.047	0.047	0.004	0.003	0.061	0.591	2.3
HYUNDAI FREEDOM		0.013		0.033		0.041	0.121	1.386		0.074		0.187		0.003		0.006	0.121	1.8
HYUNDAI INDEPENDENCE	0.033		0.010		0.047	0.190	0.280		1.390		0.060		0.262		0.003	0.021	0.280	2.0

Table B-1

Activity Data and NOx Marine Vessel Inventory for the August 3-7, 1997 Episode

	Generators					Generators		Main Engines						Auxiliary Boilers			Generators	All
Ship Name	Exit Cruise NOx (tons)	Entry PZC NOx (tons)	Exit PZC NOx (tons)	Entry Manvg NOx (tons)	Exit Manvg NOx (tons)	Hotelling NOx (tons)	Generator NOx (tons)	Entry Cruise NOx (tons)	Exit Cruise NOx (tons)	Entry PZC NOx (tons)	Exit PZC NOx (tons)	Entry Manvg NOx (tons)	Exit Manvg NOx (tons)	Entry All Cruise NOx (tons)	Exit All Cruise NOx (tons)	Hotelling+ Manvg NOx (tons)	Generators For all modes	NOx (tons) for 8/3 thru 8/7
LUTJENBURG	0.026		0.006		0.003	0.059	0.094		0.867		0.044		0.014		0.004	0.009	0.094	1.0
MAGLEBY MAERSK	0.072	0.024	0.022	0.026	0.015	0.695	0.916	0.927	1.064	0.049	0.045	0.051	0.029	0.003	0.003	0.030	0.916	3.1
MARE CASPIUM	0.022	0.008	0.006	0.009	0.009	0.317	0.392	0.599	0.584	0.043	0.033	0.031	0.030	0.004	0.003	0.053	0.392	1.8
MAREN MAERSK	0.071	0.029	0.022	0.032	0.017	0.426	0.674	1.107	1.051	0.062	0.047	0.064	0.033	0.003	0.003	0.019	0.674	3.1
MELBOURNE STAR	0.042		0.009		0.015	0.554	0.620		0.445		0.040		0.021		0.004	0.058	0.620	1.2
MING PLENTY	0.023	0.004	0.003	0.012	0.011	0.523	0.600	0.557	0.543	0.026	0.020	0.039	0.036	0.003	0.003	0.089	0.600	1.9
MOKIHANA	0.048	0.011	0.008	0.021	0.020	0.794	0.952	0.854	0.833	0.029	0.022	0.049	0.047	0.003	0.003	0.054	0.952	2.8
N O L RUBY	0.023		0.004		0.011	0.372	0.409		0.776		0.023		0.052		0.003	0.057	0.409	1.3
N O L ZIRCON	0.023		0.004		0.012	0.676	0.714		0.776		0.023		0.054		0.003	0.102	0.714	1.7
NEPTUNE JADE	0.024	0.004	0.003	0.012	0.007	0.089	0.165	0.796	0.757	0.043	0.034	0.051	0.029	0.004	0.003	0.017	0.165	1.9
NYK SEABREEZE	0.035		0.005		0.016	0.237	0.293		0.936		0.036		0.056		0.003	0.027	0.293	1.4
OOCL AMERICA	0.061		0.012		0.017	1.326	1.416		1.917		0.194		0.070		0.004	0.105	1.416	3.7
SEA-LAND CHARGER	0.044		0.012		0.010	0.470	0.537		0.994		0.049		0.031		0.003	0.036	0.537	1.7
SEA-LAND GUATEMALA	0.036	0.008	0.008	0.009	0.006	0.175	0.274	0.204	0.228	0.023	0.021	0.008	0.006	0.004	0.004	0.022	0.274	0.8
SEA-LAND PATRIOT	0.033	0.010	0.007	0.012	0.033	0.597	0.727	0.792	0.772	0.082	0.062	0.039	0.102	0.004	0.004	0.080	0.727	2.7
SOVCOMFLOT SENATOR	0.028	0.007	0.007	0.009	0.006	0.285	0.366	0.588	0.675	0.047	0.044	0.030	0.018	0.003	0.003	0.041	0.366	1.8
VLADIVOSTOK SENATOR	0.023	0.009	0.007	0.008	0.007	0.332	0.409	0.582	0.553	0.035	0.026	0.027	0.022	0.003	0.003	0.047	0.409	1.7
YURIY OSTROVSKIY	0.024		0.006		0.005	0.013	0.048		0.229		0.018		0.007		0.004	0.003	0.048	0.3
ZIM AMERICA	0.029		0.007		0.010	0.177	0.223		0.674		0.043		0.032		0.003	0.024	0.223	1.0
ZIM CANADA		0.009		0.008		0.073	0.123	0.763		0.077		0.025		0.004		0.010	0.123	1.0
CHEVRON COLORADO	0.077	0.013	0.012	0.026	0.019	0.638	0.845	0.168	0.214	0.026	0.024	0.029	0.021	0.004	0.005	0.050	0.845	1.4
CHEVRON OREGON	0.084	0.013	0.012	0.019	0.019	0.003	0.215	0.183	0.234	0.033	0.031	0.021	0.021	0.004	0.005	0.002	0.215	0.8
ARCO INDEPENDENCE								0.194		0.030		0.011		0.000		0.446	0.000	0.7
ARCO PRUDHOE BAY									0.083		0.007		0.005		0.000	0.494	0.000	0.6
ARCO SAG RIVER								0.096		0.013		0.008		0.000		0.489	0.000	0.6
ARCO SPIRIT									0.164		0.019		0.008		0.000	0.329	0.000	0.5
BLUE RIDGE								0.055		0.009		0.004		0.000		0.413	0.000	0.5
FREDERICKSBURG								0.095	0.095	0.006	0.004	0.006	0.005	0.000	0.000	0.534	0.000	0.7
MARINE CHEMIST								0.078		0.005		0.002		0.000		0.205	0.000	0.3
EWA								0.093	0.090	0.004	0.003	0.007	0.007	0.000	0.000	0.259	0.000	0.5
KAUAI								0.078	0.129	0.004	0.003	0.004	0.004	0.000	0.000	0.673	0.000	0.9
SEA-LAND CHALLENGER								0.055		0.005		0.001		0.000		0.144	0.000	0.2
MATSONIA								0.088		0.002		0.005		0.000		0.279	0.000	0.4
	1.9	0.4	0.4	0.7	0.6	22.1	27.9	31.5	38.0	3.1	2.6	2.3	2.0	0.2	0.2	7.5	27.9	115.4

Table B-1

Activity Data and NOx Marine Vessel Emissions Inventory for the August 3-7, 1997 Episode (Generator Calculations Only)

Ship Name	Call Sign	Vessel Type	Engine Type	Generators Qty	kW	Qty	kW	Qty	kW	Qty	kW	Cruise kW (80% Use)	PZC kW (80% Use)	Manvg kW (80% Use)	Hotelling kW (55% Use)
BEL ACE	3FMC6	BBU	D	3	500							400	400	400	275
FARENCO	VRUT3	BBU	D	3	500							400	400	400	275
FIVI	P3QK2	BBU	D	3	400							320	320	320	220
MODI	P3JS7	BBU	D	3	500							400	400	400	275
NOSHIRO MARU	JJHU	BBU	D	3	500							400	400	400	275
OTRADA	ELDT6	BBU	D	3	570							456	456	456	313.5
PERICLES C.G.	C4SP	BBU	D	3	440							352	352	352	242
SAGACIOUS NIKE	3FLJ6	BBU	D	3	500							400	400	400	275
SINGAPORE ACE	3FQU4	BBU	D	3	640							512	512	512	352
PACPRINCE	ELED7	BCB	D	3	550							440	440	440	302.5
PACPRINCESS	ELED8	BCB	D	3	550							440	440	440	302.5
STAR DROTTANGER	S6PD	BCB	D	3	700							560	560	560	385
KARINA BONITA	3EHT6	GGC	D	3	440							352	352	352	242
STAR GRIP	LADQ4	GGC	D	3	800							640	640	640	440
VAIMAMA	ELTC7	GGC	D	1	900	2	530					720	720	720	495
CHIQUITA FRANCES	ZCBD9	GRF	D	1	1649	4	650					1319.2	1319.2	1319.2	906.95
MAGIC	PFSJ	GRF	D	1	1275	2	600					1020	1020	1020	701.25
TUNDRA KING	ELNU5	GRF	D	4	928							742.4	742.4	742.4	510.4
HOLIDAY	3FPN5	MPR	D	5	3000							2400	2400	2400	1650
JUBILEE	3FPM5	MPR	D	5	3000							2400	2400	2400	1650
VIKING SERENADE	ELTG6	MPR	D	3	2210	1	2140					1768	1768	1768	1215.5
AYA II	D5HD	MVE	D	3	580							464	464	464	319
BELLONA	3FEA4	MVE	D	3	1000							800	800	800	550
FRANCONIA	ELKV5	MVE	D	2	760							608	608	608	418
GREEN LAKE	KGTI	MVE	D	3	950	1	170					760	760	760	522.5
HUAL CARMENCITA	LAFH4	MVE	D	3	880							704	704	704	484
OPAL RAY	9HKZ4	MVE	D	3	400							320	320	320	220
STOLT TENACITY	D5CP	TCH	D	3	850							680	680	680	467.5
BT NESTOR	VRIY	TTA	D	3	760							608	608	608	418
SAMUEL GINN	C6OB	TTA	D	3	900							720	720	720	495
ACAPULCO	DLAZ	UCC	D	3	1060							848	848	848	583
ALLIGATOR BRAVERY	3FXX4	UCC	D	3	1400	1	1200					1120	1120	1120	770
APL SINGAPORE	V7AL8	UCC	D	1	2500	3	2100					2000	2000	2000	1375
AXEL MAERSK	OXSF2	UCC	D	1	1500	1	1100	3	1000			1200	1200	1200	825
BRISBANE STAR	C6LY4	UCC	D	6	960							768	768	768	528
BROOKLYN BRIDGE	3EZJ9	UCC	D	3	1200	1	1200					960	960	960	660
CALIFORNIA JUPITER	ELKU8	UCC	D	4	1000							800	800	800	550
CALIFORNIA SATURN	ELKU9	UCC	D	4	1000							800	800	800	550
CAPE CHARLES	3EFX5	UCC	D	4	1100							880	880	880	605
CHASTINE MAERSK	OWNJ2	UCC	D	3	1250							1000	1000	1000	687.5
CHETUMAL	SXNO	UCC	D	4	1350							1080	1080	1080	742.5
DIRECT EAGLE	C6BJ9	UCC	D	3	800	1	100					640	640	640	440
DOLE ECUADOR	ELGH3	UCC	D	2	1360	3	1200	1	900			1088	1088	1088	748
EMPRESS DRAGON	3FOZ3	UCC	D	3	1300							1040	1040	1040	715
EVER GLOWING	BKJZ	UCC	D	3	820							656	656	656	451
EVER GRADE	3FOW2	UCC	D	3	700							560	560	560	385
EVER RACER	3FJL4	UCC	D	4	1360							1088	1088	1088	748
EVER UNION	3FFG7	UCC	D	4	1770							1416	1416	1416	973.5
GEORGE WASHINGTON BRIDGE	JKCF	UCC	D	3	1030	1	920					824	824	824	566.5
HANJIN LONDON	DSEI7	UCC	D	2	2300	2	1500					1840	1840	1840	1265
HANJIN PARIS	3FMK7	UCC	D	2	2300	2	1500					1840	1840	1840	1265
HYUNDAI DYNASTY	P3BA7	UCC	D	3	1350							1080	1080	1080	742.5
HYUNDAI FREEDOM	3FFS6	UCC	D	4	1775							1420	1420	1420	976.25
HYUNDAI INDEPENDENCE	3FDY6	UCC	D	4	1775							1420	1420	1420	976.25

Generator Calculations for Steamships are not applicable*

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Activity Data and NOx Marine Vessel Emissions Inventory for the August 3-7, 1997 Episode (Generator Calculations Only)

Ship Name	Call Sign	Vessel Type	Engine Type	Generators Qty	kW	Qty	kW	Qty	kW	Qty	kW	Cruise kW (80% Use)	PZC kW (80% Use)	Manvg kW (80% Use)	Hotelling kW (55% Use)
LUTJENBURG	DGLU	UCC	D	3	1100							880	880	880	605
MAGLEBY MAERSK	OUSH2	UCC	D	1	3900	1	3000	3	1600			3120	3120	3120	2145
MARE CASPIUM	V2AN5	UCC	D	3	1030	1	920					824	824	824	566.5
MAREN MAERSK	OWZU2	UCC	D	1	3900	3	1600	1	1000			3120	3120	3120	2145
MELBOURNE STAR	C6JY6	UCC	D	2	1600	2	1200					1280	1280	1280	880
MING PLENTY	BLIK	UCC	D	2	1000	2	480					800	800	800	550
MOKIHANA	WNRD	UCC	D	3	2500	2	1640					2000	2000	2000	1375
N O L RUBY	9VOP	UCC	D	3	1100	1	1000					880	880	880	605
N O L ZIRCON	9VOS	UCC	D	3	1100	1	1000					880	880	880	605
NEPTUNE JADE	9VNQ	UCC	D	3	1000	1	600					800	800	800	550
NYK SEABREEZE	ELNJ3	UCC	D	3	1500	1	1200					1200	1200	1200	825
OOCL AMERICA	ELSM7	UCC	D	1	2100							1680	1680	1680	1155
SEA-LAND CHARGER	V7AY2	UCC	D	3	2200							1760	1760	1760	1210
SEA-LAND GUATEMALA	OUJV2	UCC	D	1	1390	3	570					1112	1112	1112	764.5
SEA-LAND PATRIOT	KHRF	UCC	D	2	1300	1	900	1	650	1	240	1040	1040	1040	715
SOVCOMFLOT SENATOR	ELPX5	UCC	D	1	1200	3	910.4	1	144			960	960	960	660
VLADIVOSTOK SENATOR	ELPL2	UCC	D	1	1200	3	910.4	1	144			960	960	960	660
YURIY OSTROVSKIY	UAGJ	UCC	D	1	1000							800	800	800	550
ZIM AMERICA	4XGR	UCC	D	2	1240	1	1200					992	992	992	682
ZIM CANADA	4XGS	UCC	D	2	1240	1	1200					992	992	992	682
CHEVRON COLORADO	KLHZ	TTA	GT	1	2200	1	400					1760	1760	1760	1210
CHEVRON OREGON	WNHL	TTA	GT	1	2200	1	400					1760	1760	1760	1210
ARCO INDEPENDENCE*	KLHV	TTA	ST*												
ARCO PRUDHOE BAY*	KPFD	TTA	ST*												
ARCO SAG RIVER*	WLDF	TTA	ST*												
ARCO SPIRIT*	KHLD	TTA	ST*												
BLUE RIDGE*	KNJD	TTA	ST*												
FREDERICKSBURG*	KNJN	TTA	ST*												
MARINE CHEMIST*	KMCB	TTA	ST*												
EWA*	WEZM	UCC	ST*												
KAUAI*	WSRH	UCC	ST*												
SEA-LAND CHALLENGER*	WZJC	UCC	ST*												
MATSONIA*	KHRC	URC	ST*												

Generator Calculations for Steamships are not applicable*

Table B-1

Activity Data and NOx Marine Vessel Emissions Inventory for the August 3-7, 1997 Episode
(Generator Calculations Only)

	Cruise									Precautionary Zone Cruise (PZC)								
Ship Name	Entry Cruise Time (hours)	Exit Cruise Time (hours)	Entry Cruise kWh	Exit Cruise kWh	Medium Speed engines EMSFAC Cruise (g/kWh)	Entry Cruise NOx (g)	Exit Cruise NOx (g)	Entry Cruise NOx (tons)	Exit Cruise NOx (tons)	Entry PZC Time (hours)	Exit PZC Time (hours)	Entry PZC kWh	Exit PZC kWh	Medium Speed engines EMSFAC PZC (g/kWh)	Entry PZC NOx (g)	Exit PZC NOx (g)	Entry PZC NOx (tons)	Exit PZC NOx (tons)
BEL ACE	2.73	3.13	1091	1252	12.81	13982	16038	0.015	0.018	0.54	0.50	217	200	12.81	2776	2562	0.003	0.003
FARENCO	2.90	2.83	1161	1132	12.81	14867	14495	0.016	0.016	0.67	0.50	267	200	12.81	3416	2562	0.004	0.003
FIVI	2.77	2.70	888	866	12.81	11372	11088	0.013	0.012	0.38	0.29	120	93	12.81	1537	1196	0.002	0.001
MODI	3.00	2.85	1199	1139	12.81	15353	14585	0.017	0.016	0.67	0.50	267	200	12.81	3416	2562	0.004	0.003
NOSHIRO MARU	3.21	3.13	1284	1252	12.81	16449	16038	0.018	0.018	0.38	0.29	150	117	12.81	1922	1495	0.002	0.002
OTRADA	2.54	2.41	1158	1100	12.81	14832	14091	0.016	0.016	0.38	0.29	171	133	12.81	2191	1704	0.002	0.002
PERICLES C.G.	2.90	2.75	1021	970	12.81	13075	12421	0.014	0.014	0.67	0.50	235	176	12.81	3006	2255	0.003	0.002
SAGACIOUS NIKE	2.90	2.83	1159	1130	12.81	14852	14481	0.016	0.016	0.67	0.50	267	200	12.81	3416	2562	0.004	0.003
SINGAPORE ACE	3.35	3.27	1717	1674	12.81	21998	21448	0.024	0.024	0.67	0.50	341	256	12.81	4372	3279	0.005	0.004
PACPRINCE	3.07	2.91	1350	1282	12.81	17290	16425	0.019	0.018	0.67	0.50	293	220	12.81	3758	2818	0.004	0.003
PACPRINCESS	2.50	2.86	1099	1260	12.81	14073	16143	0.015	0.018	0.54	0.50	238	220	12.81	3053	2818	0.003	0.003
STAR DROTTANGER	2.55	2.85	1426	1594	12.81	18270	20419	0.020	0.022	0.63	0.50	350	280	12.81	4484	3587	0.005	0.004
KARINA BONITA	2.62	2.49	921	875	12.81	11798	11208	0.013	0.012	0.67	0.50	235	176	12.81	3006	2255	0.003	0.002
STAR GRIP	2.70	2.57	1731	1645	12.81	22177	21068	0.024	0.023	0.38	0.29	240	187	12.81	3074	2391	0.003	0.003
VAIMAMA	2.45	2.81	1761	2020	12.81	22560	25878	0.025	0.029	0.54	0.50	390	360	12.81	4996	4612	0.006	0.005
CHIQUITA FRANCES	1.87	2.09	2464	2754	12.81	31569	35284	0.035	0.039	0.54	0.50	715	660	12.81	9154	8449	0.010	0.009
MAGIC	1.87	2.09	1905	2130	12.81	24409	27281	0.027	0.030	0.54	0.50	553	510	12.81	7078	6533	0.008	0.007
TUNDRA KING	2.20	2.09	1632	1550	12.81	20901	19856	0.023	0.022	0.38	0.29	278	217	12.81	3566	2774	0.004	0.003
HOLIDAY	2.91	3.25	6974	7795	12.81	89342	99852	0.098	0.110	0.63	0.50	1500	1200	12.81	19215	15372	0.021	0.017
JUBILEE	2.67	2.99	6410	7164	12.81	82113	91773	0.090	0.101	0.63	0.50	1500	1200	12.81	19215	15372	0.021	0.017
VIKING SERENADE	3.09	3.45	5465	6108	12.81	70003	78239	0.077	0.086	0.63	0.50	1105	884	12.81	14155	11324	0.016	0.012
AYA II	2.08	2.38	963	1105	12.81	12338	14152	0.014	0.016	0.63	0.50	290	232	12.81	3715	2972	0.004	0.003
BELLONA	2.44	2.38	1954	1905	12.81	25026	24400	0.028	0.027	0.67	0.50	533	400	12.81	6832	5124	0.008	0.006
FRANCONIA	2.11	2.42	1283	1472	12.81	16441	18858	0.018	0.021	0.54	0.50	329	304	12.81	4219	3894	0.005	0.004
GREEN LAKE	2.41	2.35	1830	1785	12.81	23449	22862	0.026	0.025	0.67	0.50	507	380	12.81	6490	4868	0.007	0.005
HUAL CARMENCITA	2.40	2.34	1687	1645	12.81	21607	21067	0.024	0.023	0.38	0.29	264	205	12.81	3382	2630	0.004	0.003
OPAL RAY	2.43	2.37	777	758	12.81	9955	9706	0.011	0.011	0.38	0.29	120	93	12.81	1537	1196	0.002	0.001
STOLT TENACITY	2.88	2.51	1955	1708	12.81	25044	21878	0.028	0.024	0.67	0.50	453	340	12.81	5807	4355	0.006	0.005
BT NESTOR	2.32	2.59	1408	1573	12.81	18033	20154	0.020	0.022	0.54	0.50	329	304	12.81	4219	3894	0.005	0.004
SAMUEL GINN	3.33	2.98	2395	2148	12.81	30685	27511	0.034	0.030	0.67	0.50	480	360	12.81	6149	4612	0.007	0.005
ACAPULCO	1.70	1.95	1440	1652	12.81	18448	21161	0.020	0.023	0.63	0.50	530	424	12.81	6789	5431	0.007	0.006
ALLIGATOR BRAVERY	1.86	1.82	2085	2033	12.81	26714	26046	0.029	0.029	0.38	0.29	420	327	12.81	5380	4185	0.006	0.005
APL SINGAPORE	1.66	1.62	3320	3237	12.81	42523	41460	0.047	0.046	0.38	0.29	750	583	12.81	9608	7473	0.011	0.008
AXEL MAERSK	1.82	1.77	2180	2125	12.81	27921	27223	0.031	0.030	0.67	0.50	800	600	12.81	10248	7686	0.011	0.008
BRISBANE STAR	2.14	2.09	1647	1606	12.81	21095	20567	0.023	0.023	0.38	0.29	288	224	12.81	3689	2869	0.004	0.003
BROOKLYN BRIDGE	2.07	2.01	1983	1933	12.81	25398	24763	0.028	0.027	0.67	0.50	640	480	12.81	8198	6149	0.009	0.007
CALIFORNIA JUPITER	2.00	1.95	1598	1558	12.81	20476	19964	0.023	0.022	0.38	0.29	300	233	12.81	3843	2989	0.004	0.003
CALIFORNIA SATURN	1.70	1.95	1359	1558	12.81	17404	19964	0.019	0.022	0.63	0.50	500	400	12.81	6405	5124	0.007	0.006
CAPE CHARLES	1.70	1.95	1495	1714	12.81	19145	21960	0.021	0.024	0.63	0.50	550	440	12.81	7046	5636	0.008	0.006
CHASTINE MAERSK	2.02	2.26	2020	2257	12.81	25871	28915	0.028	0.032	0.54	0.50	542	500	12.81	6939	6405	0.008	0.007
CHETUMAL	1.87	1.78	2020	1919	12.81	25878	24584	0.028	0.027	0.38	0.29	405	315	12.81	5188	4035	0.006	0.004
DIRECT EAGLE	2.34	2.22	1498	1423	12.81	19194	18235	0.021	0.020	0.38	0.29	240	187	12.81	3074	2391	0.003	0.003
DOLE ECUADOR	1.85	2.07	2013	2250	12.81	25789	28823	0.028	0.032	0.63	0.50	680	544	12.81	8711	6969	0.010	0.008
EMPRESS DRAGON	1.89	1.84	1961	1912	12.81	25122	24494	0.028	0.027	0.67	0.50	693	520	12.81	8882	6661	0.010	0.007
EVER GLOWING	2.12	2.01	1390	1320	12.81	17801	16911	0.020	0.019	0.38	0.29	246	191	12.81	3151	2451	0.003	0.003
EVER GRADE	2.14	2.09	1201	1171	12.81	15382	14997	0.017	0.017	0.38	0.29	210	163	12.81	2690	2092	0.003	0.002
EVER RACER	1.61	1.80	1752	1958	12.81	22445	25086	0.025	0.028	0.63	0.50	680	544	12.81	8711	6969	0.010	0.008
EVER UNION	1.96	1.91	2774	2705	12.81	35536	34648	0.039	0.038	0.38	0.29	531	413	12.81	6802	5291	0.007	0.006
GEORGE WASHINGTON BRIDGE	1.96	1.91	1616	1575	12.81	20697	20180	0.023	0.022	0.67	0.50	549	412	12.81	7037	5278	0.008	0.006
HANJIN LONDON	1.69	1.65	3111	3033	12.81	39849	38852	0.044	0.043	0.67	0.50	1227	920	12.81	15714	11785	0.017	0.013
HANJIN PARIS	1.82	1.78	3351	3267	12.81	42924	41850	0.047	0.046	0.67	0.50	1227	920	12.81	15714	11785	0.017	0.013
HYUNDAI DYNASTY	2.04	1.99	2208	2153	12.81	28285	27578	0.031	0.030	0.67	0.50	720	540	12.81	9223	6917	0.010	0.008
HYUNDAI FREEDOM	1.66	1.62	2357	2298	12.81	30194	29439	0.033	0.032	0.67	0.50	947	710	12.81	12127	9095	0.013	0.010
HYUNDAI INDEPENDENCE	1.71	1.66	2421	2361	12.81	31015	30239	0.034	0.033	0.67	0.50	947	710	12.81	12127	9095	0.013	0.010

Generator Calculations for Steamships are not applicable*

Table B-1

Activity Data and NOx Marine Vessel Emissions Inventory for the August 3-7, 1997 Episode
(Generator Calculations Only)

	Cruise									Precautionary Zone Cruise (PZC)								
Ship Name	Entry Cruise Time (hours)	Exit Cruise Time (hours)	Entry Cruise kWh	Exit Cruise kWh	Medium Speed engines EMSFAC Cruise (g/kWh)	Entry Cruise NOx (g)	Exit Cruise NOx (g)	Entry Cruise NOx (tons)	Exit Cruise NOx (tons)	Entry PZC Time (hours)	Exit PZC Time (hours)	Entry PZC kWh	Exit PZC kWh	Medium Speed engines EMSFAC PZC (g/kWh)	Entry PZC NOx (g)	Exit PZC NOx (g)	Entry PZC NOx (tons)	Exit PZC NOx (tons)
LUTJENBURG	1.95	2.12	1719	1870	12.81	22023	23950	0.024	0.026	0.67	0.50	587	440	12.81	7515	5636	0.008	0.006
MAGLEBY MAERSK	1.43	1.64	4470	5127	12.81	57258	65679	0.063	0.072	0.54	0.50	1690	1560	12.81	21649	19984	0.024	0.022
MARE CASPIUM	1.94	1.89	1600	1560	12.81	20496	19984	0.023	0.022	0.67	0.50	549	412	12.81	7037	5278	0.008	0.006
MAREN MAERSK	1.71	1.62	5333	5067	12.81	68320	64904	0.075	0.071	0.67	0.50	2080	1560	12.81	26645	19984	0.029	0.022
MELBOURNE STAR	2.08	2.32	2657	2969	12.81	34035	38039	0.037	0.042	0.63	0.50	800	640	12.81	10248	8198	0.011	0.009
MING PLENTY	2.09	2.04	1675	1634	12.81	21462	20925	0.024	0.023	0.38	0.29	300	233	12.81	3843	2989	0.004	0.003
MOKIHANA	1.76	1.72	3524	3436	12.81	45145	44017	0.050	0.048	0.38	0.29	750	583	12.81	9608	7473	0.011	0.008
N O L RUBY	1.86	1.82	1639	1598	12.81	20996	20471	0.023	0.023	0.38	0.29	330	257	12.81	4227	3288	0.005	0.004
N O L ZIRCON	1.86	1.82	1639	1598	12.81	20996	20471	0.023	0.023	0.38	0.29	330	257	12.81	4227	3288	0.005	0.004
NEPTUNE JADE	2.25	2.14	1803	1713	12.81	23101	21946	0.025	0.024	0.38	0.29	300	233	12.81	3843	2989	0.004	0.003
NYK SEABREEZE	2.11	2.06	2534	2471	12.81	32460	31649	0.036	0.035	0.38	0.29	450	350	12.81	5765	4484	0.006	0.005
OOCL AMERICA	2.65	2.58	4450	4339	12.81	57009	55584	0.063	0.061	0.67	0.50	1120	840	12.81	14347	10760	0.016	0.012
SEA-LAND CHARGER	1.83	1.79	3223	3143	12.81	41292	40260	0.045	0.044	0.67	0.50	1173	880	12.81	15030	11273	0.017	0.012
SEA-LAND GUATEMALA	2.05	2.29	2281	2549	12.81	29217	32654	0.032	0.036	0.54	0.50	602	556	12.81	7716	7122	0.008	0.008
SEA-LAND PATRIOT	2.34	2.28	2433	2372	12.81	31164	30384	0.034	0.033	0.67	0.50	693	520	12.81	8882	6661	0.010	0.007
SOVCOMFLOT SENATOR	1.78	2.04	1708	1959	12.81	21880	25097	0.024	0.028	0.54	0.50	520	480	12.81	6661	6149	0.007	0.007
VLADIVOSTOK SENATOR	1.76	1.67	1688	1604	12.81	21622	20541	0.024	0.023	0.67	0.50	640	480	12.81	8198	6149	0.009	0.007
YURIY OSTROVSKIY	2.28	2.17	1825	1734	12.81	23377	22208	0.026	0.024	0.67	0.50	533	400	12.81	6832	5124	0.008	0.006
ZIM AMERICA	1.78	2.04	1765	2024	12.81	22609	25934	0.025	0.029	0.54	0.50	537	496	12.81	6883	6354	0.008	0.007
ZIM CANADA	2.31	2.19	2291	2176	12.81	29348	27880	0.032	0.031	0.67	0.50	661	496	12.81	8472	6354	0.009	0.007
CHEVRON COLORADO	2.41	3.09	4244	5430	12.81	54365	69556	0.060	0.077	0.54	0.50	953	880	12.81	12212	11273	0.013	0.012
CHEVRON OREGON	2.63	3.37	4637	5933	12.81	59399	75996	0.065	0.084	0.54	0.50	953	880	12.81	12212	11273	0.013	0.012
ARCO INDEPENDENCE*																		
ARCO PRUDHOE BAY*																		
ARCO SAG RIVER*																		
ARCO SPIRIT*																		
BLUE RIDGE*																		
FREDERICKSBURG*																		
MARINE CHEMIST*																		
EWA*																		
KAUAI*																		
SEA-LAND CHALLENGER*																		
MATSONIA*																		

Generator Calculations for Steamships are not applicable*

Table B-1

Activity Data and NOx Marine Vessel Emissions Inventory for the August 3-7, 1997 Episode (Generator Calculations Only)

	Maneuvering									Hotelling			
Ship Name	Entry Manvg (hrs)	Exit Manvg (hrs)	Entry Manvg kWh	Exit Manvg kWh	Medium Speed engines EMSFAC Manvg (g/kWh)	Entry Manvg NOx (g)	Exit Manvg NOx (g)	Entry Manvg NOx (tons)	Exit Manvg NOx (tons)	Hotelling (hrs)	EMSFAC Hotelling for Medium Speed engines (g/kWh)	Hotelling NOx (g)	Hotelling NOx (tons)
BEL ACE	0.33	0.58	132	232	12.81	1691	2972	0.002	0.003	3.51	13.57	13088	0.01
FARENCO	0.35	2.58	140	1032	12.81	1793	13220	0.002	0.015	102.88	13.57	384006	0.42
FIVI	1.67	1.50	533	480	12.81	6832	6149	0.008	0.007	119.98	13.57	358264	0.39
MODI	0.42	0.38	167	153	12.81	2135	1964	0.002	0.002	10.70	13.57	39937	0.04
NOSHIRO MARU	0.92	0.50	367	200	12.81	4697	2562	0.005	0.003	89.33	13.57	333431	0.37
OTRADA	1.17	0.75	532	342	12.81	6815	4381	0.008	0.005	13.50	13.57	57442	0.06
PERICLES C.G.	1.25	0.73	440	258	12.81	5636	3307	0.006	0.004	18.85	13.57	61914	0.07
SAGACIOUS NIKE	0.72	1.25	287	500	12.81	3672	6405	0.004	0.007	80.02	13.57	298657	0.33
SINGAPORE ACE	0.50	1.25	256	640	12.81	3279	8198	0.004	0.009	45.90	13.57	219288	0.24
PACPRINCE	0.50	1.25	220	550	12.81	2818	7046	0.003	0.008	19.83	13.57	81429	0.09
PACPRINCESS	1.25	1.25	550	550	12.81	7046	7046	0.008	0.008	33.07	13.57	135761	0.15
STAR DROTTANGER	1.33	0.67	747	373	12.81	9565	4782	0.011	0.005	38.50	13.57	201178	0.22
KARINA BONITA	0.42	0.93	147	329	12.81	1879	4209	0.002	0.005	42.48	13.57	139538	0.15
STAR GRIP	1.17	0.67	747	427	12.81	9565	5466	0.011	0.006	6.42	13.57	38320	0.04
VAIMAMA	0.83	0.42	600	300	12.81	7686	3843	0.008	0.004	18.58	13.57	124850	0.14
CHIQUITA FRANCES	1.58	0.50	2089	660	12.81	26757	8449	0.029	0.009	18.48	13.57	227522	0.25
MAGIC	0.88	0.90	901	918	12.81	11542	11760	0.013	0.013	19.38	13.57	184485	0.20
TUNDRA KING	0.67	0.58	495	433	12.81	6340	5548	0.007	0.006	11.67	13.57	80820	0.09
HOLIDAY	0.75	0.50	1800	1200	12.81	23058	15372	0.025	0.017	10.75	13.57	240742	0.27
JUBILEE	0.90	0.48	2160	1160	12.81	27670	14860	0.030	0.016	8.87	13.57	198566	0.22
VIKING SERENADE	1.00	0.47	1768	825	12.81	22648	10569	0.025	0.012	9.62	13.57	158650	0.17
AYA II	1.58	0.83	735	387	12.81	9411	4953	0.010	0.005	6.25	13.57	27060	0.03
BELLONA	0.03	0.75	27	600	12.81	342	7686	0.000	0.008	18.97	13.57	141584	0.16
FRANCONIA	1.07	0.72	649	436	12.81	8308	5582	0.009	0.006	2.08	13.57	11819	0.01
GREEN LAKE	1.25	0.83	950	633	12.81	12170	8113	0.013	0.009	17.50	13.57	124104	0.14
HUAL CARMENCITA	1.33	0.72	939	505	12.81	12024	6463	0.013	0.007	11.95	13.57	78501	0.09
OPAL RAY	1.17	0.75	373	240	12.81	4782	3074	0.005	0.003	97.98	13.57	292573	0.32
STOLT TENACITY	0.25	0.75	170	510	12.81	2178	6533	0.002	0.007	52.23	13.57	331428	0.37
BT NESTOR	0.78	0.38	476	233	12.81	6101	2986	0.007	0.003	27.20	13.57	154314	0.17
SAMUEL GINN	0.75	0.75	540	540	12.81	6917	6917	0.008	0.008	23.90	13.57	160569	0.18
ACAPULCO	4.00	0.42	3392	353	12.81	43452	4526	0.048	0.005	33.50	13.57	265078	0.29
ALLIGATOR BRAVERY	1.33	0.92	1493	1027	12.81	19130	13152	0.021	0.014	41.50	13.57	433709	0.48
APL SINGAPORE	0.73	0.47	1467	933	12.81	18788	11956	0.021	0.013	75.20	13.57	1403397	1.55
AXEL MAERSK	0.67	0.45	800	540	12.81	10248	6917	0.011	0.008	19.30	13.57	216108	0.24
BRISBANE STAR	1.25	1.17	960	896	12.81	12298	11478	0.014	0.013	10.15	13.57	72738	0.08
BROOKLYN BRIDGE	0.88	0.48	848	464	12.81	10863	5944	0.012	0.007	40.93	13.57	366675	0.40
CALIFORNIA JUPITER	1.00	1.08	800	867	12.81	10248	11102	0.011	0.012	18.23	13.57	136110	0.15
CALIFORNIA SATURN	1.75	0.83	1400	667	12.81	17934	8540	0.020	0.009	8.40	13.57	62705	0.07
CAPE CHARLES	0.95	0.77	836	675	12.81	10709	8642	0.012	0.010	2.40	13.57	19707	0.02
CHASTINE MAERSK	0.83	0.33	833	333	12.81	10675	4270	0.012	0.005	50.07	13.57	467177	0.51
CHETUMAL	0.58	0.17	630	180	12.81	8070	2306	0.009	0.003	36.50	13.57	367832	0.41
DIRECT EAGLE	0.67	0.37	427	235	12.81	5466	3006	0.006	0.003	40.23	13.57	240269	0.26
DOLE ECUADOR	1.00	0.80	1088	870	12.81	13937	11150	0.015	0.012	29.20	13.57	296445	0.33
EMPRESS DRAGON	0.73	0.25	763	260	12.81	9770	3331	0.011	0.004	47.77	13.57	463544	0.51
EVER GLOWING	1.00	0.48	656	317	12.81	8403	4062	0.009	0.004	5.65	13.57	34585	0.04
EVER GRADE	0.92	0.42	513	233	12.81	6576	2989	0.007	0.003	28.67	13.57	149795	0.16
EVER RACER	0.83	1.00	907	1088	12.81	11614	13937	0.013	0.015	17.98	13.57	182571	0.20
EVER UNION	1.08	0.50	1534	708	12.81	19651	9069	0.022	0.010	44.00	13.57	581364	0.64
GEORGE WASHINGTON BRIDGE	0.78	0.45	645	371	12.81	8268	4750	0.009	0.005	69.02	13.57	530657	0.58
HANJIN LONDON	1.12	0.83	2055	1533	12.81	26320	19642	0.029	0.022	0.28	13.57	4865	0.01
HANJIN PARIS	0.92	0.92	1687	1687	12.81	21606	21606	0.024	0.024	13.00	13.57	223200	0.25
HYUNDAI DYNASTY	0.95	0.95	1026	1026	12.81	13143	13143	0.014	0.014	43.52	13.57	438543	0.48
HYUNDAI FREEDOM	1.67	0.95	2367	1349	12.81	30317	17281	0.033	0.019	2.82	13.57	37321	0.04
HYUNDAI INDEPENDENCE	0.87	2.33	1231	3313	12.81	15765	42444	0.017	0.047	13.00	13.57	172252	0.19

Generator Calculations for Steamships are not applicable*

Table B-1

Activity Data and NOx Marine Vessel Emissions Inventory for the August 3-7, 1997 Episode (Generator Calculations Only)

	Maneuvering									Hotelling			
Ship Name	Entry Manvg (hrs)	Exit Manvg (hrs)	Entry Manvg kWh	Exit Manvg kWh	Medium Speed engines EMSFAC Manvg (g/kWh)	Entry Manvg NOx (g)	Exit Manvg NOx (g)	Entry Manvg NOx (tons)	Exit Manvg NOx (tons)	Hotelling (hrs)	EMSFAC Hotelling for Medium Speed engines (g/kWh)	Hotelling NOx (g)	Hotelling NOx (tons)
LUTJENBURG	0.67	0.25	587	220	12.81	7515	2818	0.008	0.003	6.50	13.57	53374	0.06
MAGLEBY MAERSK	0.58	0.33	1820	1040	12.81	23314	13322	0.026	0.015	21.67	13.57	630782	0.69
MARE CASPIUM	0.75	0.73	618	604	12.81	7917	7741	0.009	0.009	37.43	13.57	287818	0.32
MAREN MAERSK	0.73	0.38	2288	1196	12.81	29309	15321	0.032	0.017	13.30	13.57	387203	0.43
MELBOURNE STAR	0.85	0.83	1088	1067	12.81	13937	13664	0.015	0.015	42.08	13.57	502635	0.55
MING PLENTY	1.08	1.00	867	800	12.81	11102	10248	0.012	0.011	63.58	13.57	474642	0.52
MOKIHANA	0.75	0.72	1500	1433	12.81	19215	18361	0.021	0.020	38.62	13.57	720671	0.79
N O L RUBY	0.92	0.90	807	792	12.81	10333	10146	0.011	0.011	41.10	13.57	337487	0.37
N O L ZIRCON	0.95	0.95	836	836	12.81	10709	10709	0.012	0.012	74.72	13.57	613526	0.68
NEPTUNE JADE	1.08	0.62	867	493	12.81	11102	6320	0.012	0.007	10.80	13.57	80621	0.09
NYK SEABREEZE	1.10	0.92	1320	1100	12.81	16909	14091	0.019	0.016	19.25	13.57	215548	0.24
OOCL AMERICA	0.67	0.70	1120	1176	12.81	14347	15065	0.016	0.017	76.80	13.57	1203935	1.33
SEA-LAND CHARGER	0.62	0.42	1085	733	12.81	13903	9394	0.015	0.010	26.00	13.57	426991	0.47
SEA-LAND GUATEMALA	0.55	0.38	612	426	12.81	7835	5460	0.009	0.006	15.32	13.57	158928	0.18
SEA-LAND PATRIOT	0.85	2.25	884	2340	12.81	11324	29975	0.012	0.033	55.82	13.57	541664	0.60
SOVCOMFLOT SENATOR	0.67	0.42	640	400	12.81	8198	5124	0.009	0.006	28.92	13.57	259031	0.29
VLADIVOSTOK SENATOR	0.60	0.50	576	480	12.81	7379	6149	0.008	0.007	33.65	13.57	301432	0.33
YURIY OSTROVSKIY	0.67	0.47	533	373	12.81	6832	4782	0.008	0.005	1.53	13.57	11446	0.01
ZIM AMERICA	0.82	0.72	810	711	12.81	10378	9107	0.011	0.010	17.37	13.57	160754	0.18
ZIM CANADA	0.57	0.55	562	546	12.81	7201	6989	0.008	0.008	7.17	13.57	66338	0.07
CHEVRON COLORADO	1.03	0.75	1819	1320	12.81	23297	16909	0.026	0.019	35.30	13.57	579722	0.64
CHEVRON OREGON	0.75	0.75	1320	1320	12.81	16909	16909	0.019	0.019	0.17	13.57	2737	0.00
ARCO INDEPENDENCE*													
ARCO PRUDHOE BAY*													
ARCO SAG RIVER*													
ARCO SPIRIT*													
BLUE RIDGE*													
FREDERICKSBURG*													
MARINE CHEMIST*													
EWA*													
KAUAI*													
SEA-LAND CHALLENGER*													
MATSONIA*													

Generator Calculations for Steamships are not applicable*

Table B-2

U.S. Navy Vessel Inventory

Ship Class	Ship Type	Average Ship Speed (Knots)	Longitude 1	Latitude 1	Longitude 2	Latitude 2	Port Visited (at pierside)	Reported in Greenwich Mean Time: Time 1 Hrs	Time 1 Min	Time 2 Hrs	Time 2 Min	Time Duration (Hrs)	Start Date	End Date	NOx Kg/Hr	SOx Kg/Hr	HC Kg/Hr	CO Kg/Hr	PM Kg/Hr
FFG 7	Frigate																		
1		0.00	117.17	32.72	117.17	32.72	San Diego	7	0	13	51	6.85	8/3/97	8/4/97	Cold Iron (No Emissions)				
2		15.83	117.17	32.72	117.53	33.05		13	51	16	0	2.15	8/4/97	8/4/97	29.53	17.45	5.55	69.31	2.12
3		20.86	117.53	33.05	118.10	33.72		16	0	19	59	3.98	8/4/97	8/4/97	34.49	22.40	4.00	49.75	2.35
4		0.00	118.10	33.72	118.10	33.72	Seal Beach	19	59	21	54	25.91	8/4/97	8/5/97	Cold Iron (No Emissions)				
5		13.96	118.10	33.72	118.15	33.58		21	54	23	59	2.08	8/5/97	8/5/97	28.52	16.35	5.97	74.49	2.07
6		5.19	118.15	33.58	117.63	33.13		23	59	8	0	8.00	8/5/97	8/6/97	26.43	13.97	6.99	86.85	1.96
7		6.57	117.63	33.13	117.17	32.72		8	0	16	4	8.07	8/6/97	8/6/97	26.56	14.12	6.92	86.05	1.97
8		0.00	117.17	32.72	117.17	32.72	San Diego	16	4	7	0	14.93	8/6/97	8/8/97	Cold Iron (No Emissions)				
LSD 36	Auxiliary																		
1		0.00	117.17	32.72	117.17	32.72	San Diego	7	0	15	31	32.52	8/3/97	8/4/97	Cold Iron (No Emissions)				
2		7.62	117.17	32.72	117.47	32.62		15	31	19	0	3.45	8/4/97	8/4/97	3.81	11.46	0.48	0.65	2.42
3		11.41	117.47	32.62	117.17	32.72		19	0	22	59	3.98	8/4/97	8/4/97	5.75	17.30	0.73	0.97	3.65
4		0.00	117.17	32.72	117.17	32.72	San Diego	22	59	15	34	0.00	8/4/97	8/6/97	Cold Iron (No Emissions)				
5		10.00	117.17	32.72	117.18	32.58		15	34	16	0	0.43	8/6/97	8/6/97	4.91	14.76	0.62	0.83	3.12
6		10.13	117.18	32.58	117.23	32.58		16	0	17	0	1.00	8/6/97	8/6/97	4.98	14.97	0.63	0.84	3.16
7		3.90	117.23	32.58	117.41	32.67		17	0	19	0	2.00	8/6/97	8/6/97	2.31	6.96	0.29	0.39	1.47
8		10.67	117.41	32.67	117.57	32.83		19	0	3	0	8.00	8/6/97	8/7/97	5.28	15.90	0.67	0.90	3.36
9		6.30	117.57	32.83	117.58	32.80		3	0	19	0	16.00	8/7/97	8/7/97	3.29	9.89	0.42	0.56	2.09
10		12.83	117.58	32.80	117.48	32.58		19	0	20	0	1.00	8/7/97	8/7/97	6.82	20.51	0.87	1.16	4.33
11		9.46	117.48	32.58	117.17	32.72		20	0	22	47	2.78	8/7/97	8/7/97	4.63	13.92	0.59	0.78	2.94
12		0.00	117.17	32.72	117.17	32.72	San Diego	22	47	7	0	8.22	8/7/98	8/8/97	Cold Iron (No Emissions)				
DD 963	Destroyer																		
1		0.00	117.17	32.72	117.17	32.72	San Diego	7	0	14	24	45.40	8/3/97	8/5/97	Cold Iron (No Emissions)				
2		4.63	117.17	32.72	117.31	32.62		14	24	15	0	0.60	8/5/97	8/5/97	24.89	27.12	11.95	166.21	2.88
3		8.58	117.31	32.62	117.22	32.65		15	0	16	0	1.00	8/5/97	8/5/97	27.83	30.52	10.45	148.12	3.03
4		5.35	117.22	32.65	117.96	32.61		16	0	19	0	3.00	8/5/97	8/5/97	25.22	27.52	11.76	164.03	2.89
5		9.29	117.96	32.61	118.37	32.37	Leaving Zone	19	0	21	48	2.80	8/5/97	8/5/97	28.67	31.46	10.07	143.42	3.07
6		15.83	118.37	32.37	118.67	32.37	Out of Zone	21	48	23	48	2.00	8/5/97	8/5/97	Cold Iron (No Emissions)				
7		1.45	118.67	32.37	118.67	32.62	Returning to Zone	23	48	3	0	3.20	8/5/97	8/6/97	24.45	26.60	12.19	169.15	2.85
8		3.56	118.67	32.62	118.56	32.46		3	0	15	0	12.00	8/6/97	8/6/97	24.55	26.72	12.13	168.45	2.86
9		6.21	118.56	32.46	118.10	32.69		15	0	19	0	4.00	8/6/97	8/6/97	25.73	28.12	11.49	160.74	2.92
10		7.18	118.10	32.69	117.64	32.85		19	0	3	0	8.00	8/6/97	8/7/97	26.47	28.97	11.11	156.18	2.96